HOUSEHOLD MANUAL OF MEDICINE

SURGERY NURSING AND HYGIENE

HARTSHORNE

THE PRACTICAL

HOUSEHOLD PHYSICIAN.

A CYCLOPEDIA

OF

Family Medicine, Surgery, Nursing and Hygiene

FOR DAILY USE IN

THE PRESERVATION OF HEALTH AND CARE OF THE SICK AND INJURED.

CONTAINING A PLAIN DESCRIPTION OF THE PARTS OF THE HUMAN BODY AND THEIR USES; CHAPTERS ON "OUR HOMES," CLIMATE, FOOD AND DRINK, USE OF INTOXICANTS AND NARCOTICS; SPECIAL CHAPTERS GIVING IMPORTANT INFORMATION FOR EVERY WOMAN; WITH CLEAR AND FULL INFORMATION FOR ASSISTING THE SKILLFUL EFFORTS OF THE DOCTOR, AND FOR THE TREATMENT OF ACCIDENTS AND DISEASES. ARRANGED FOR READY REFERENCE TO ENABLE ONE TO DO INSTANTLY WHAT CAN AND OUGHT TO BE DONE IN EMERGENCIES TO RELIEVE SUFFERING OR SAVE LIFE.

BY

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WITH EIGHT COLORED PLATES AND NEARLY THREE HUNDRED WOOD-CUT ILLUSTRATIONS.

NEW AND REVISED EDITION.

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PREFACE.

IT is the aim of this book to convey, in a simple manner, all the information likely to be wanted by unprofessional persons, concerning the preservation of health, and the care of those who suffer from disease and injury.

No intention is herein implied to supersede the attendance of physicians or surgeons upon persons who are ill or seriously hurt. On the contrary, it is hoped that the readers of this book will be thereby better prepared to appreciate and assist the skilful efforts of medical practitioners to relieve suffering and save or prolong life. But there are, especially in the country, many instances of sudden illness, or of accident, when no physician can be obtained, perhaps for several hours. It is then very desirable that some one, at least, if not all concerned, should know enough to do promptly what can and ought to be done; as delay may sometimes, indeed often, make the difference between life and death. Moreover, many ailments occur in families, particularly among children, hardly severe enough for it to seem necessary to send for a physician; and yet in which it is important not to neglect symptoms and conditions, which, without early care, may grow worse and give much trouble. The "stitch in time" is here a very applicable byword. Such treatment as can only be safely and advantageously carried out under the direction of a physician or surgeon is, if mentioned at all, not dwelt upon in the present work; the reader being referred, for special and extended information of that kind, to professional medical treatises.

The outline of Anatomy and Physiology given in this book is purposely brief; but, aided by the illustrations, it may suffice, for those before unacquainted with the subject, to make more intelligible the statements and allusions occurring in the rest of the volume.

Hygiene, the science and art of the Preservation of Health, is systematically treated in the second division of the work. The author hopes that a careful perusal of what is said in these pages upon that subject will reward some readers, at least, for the time devoted to them.

Under Domestic Medicine, after general considerations concerning the Nature, Causation, and Symptoms of Diseases, and upon the modes of action of Remedies, attention is given at considerable length to Nursing. Then, in regard to Special Diseases, Accidents, Injuries, and Poisoning, information is supplied in detail, such as appears to be suitable for a work on Home Medicine and Surgery. Those portions of the book are arranged *alphabetically;* for easy and convenient reference. As there are, besides a very full General Index, several special Indexes, it is hoped that few if any questions appropriate to such a work will occur, to which answers may not be readily found in it, expressed in terms which will be understood by all.

PRRFACE TO THE FOURTH EDITION.

The author has made, for this edition, a careful revision of the book. While no extensive change seemed to be called for, numerous additions and emendations have been introduced, bringing the information given down to a later period. Also, many *new references to pages*, in the course of articles, are put in, to make the book more handy for every-day use; and the language has been made, in several places, still more simple and popular.

The author and publisher are grateful for many commendations of the plan and execution of this work, from physicians and other competent judges. Some persons who have looked at it rather hastily observe that, in dealing with special diseases, the reader is not always told of a *sure and immediate cure* for each complaint. On this it may be remarked that so-called "certain cures" are nearly always useless or dangerous; possibly good in some cases and bad in others. The object of this book is to set forth what is safe, leaving perilous responsibilities to the physician.

HOW BEST TO USE THIS BOOK.

Two purposes belong to it: 1. To impart such knowledge as will enable every one to *keep good health*. 2. To give information about *what to do* for those who are sick or hurt in any way when no physician or surgeon is at hand. It is *not meant to take the place* of a doctor in *severe illness* or *injury* (see p. 515), but to show how to do the *best possible* in the absence of a doctor.

One who knows little about physiology will do well to read carefully the sections on ANATOMY and PHYSIOLOGY (pp. 35–112). All who possess the book are advised to *read the whole* of the section on HYGIENE (pp. 117–457). It is meant to tell all about *how to keep well*. The author has tried to make it interesting and easily understood.

Heads of families or those who expect to become such may find it to their advantage to read, in the DOMESTIC MEDICINE (Part I., from p. 461 to p. 495), on the CAUSES AND NATURE OF DISEASES; also, Part II., from p. 514 to p. 551, on REMEDIES; and especially Part III., on NURSING, from p. 620 to p. 647. Mothers and nurses should also read carefully from p. 640 to p. 660. Part VII., on OLD AGE and DEATH, pp. 917 and 918, is short and easily read. As action in cases of *poisoning* must be very prompt, it will be well for every one to know beforehand the main facts given in Part VI., on POISONING, from pp. 887 to 915.

SIGNS AND SYMPTOMS OF DISEASE, from p. 498 to p. 513, will be worth studying by those who have patience for it; but that part of the book is very condensed, and is somewhat hard reading.

SPECIAL DISEASES are arranged in the *alphabetical order* of their names, from p. 661 to p. 836, and ACCIDENTS AND INJURIES, in the same way, from p. 837 to p. 883; POISONS, from p. 887 to p. 915. These portions of the book are suited either for reading or for *ready reference in time of need*. Most persons will use them chiefly for *refer-*

ence. In the treatment of diseases and injuries all is told that can be safely done without a doctor. For information about what *more* a doctor will find and may do, readers may be referred to strictly *medical books* (as, for example, the author's *Essentials of Practical Medicine* or Flint's *Practice of Medicine, etc.*).

DOSES OF MEDICINES are given from p. 615 to p. 617, and GIVING MEDICINES is considered from p. 640 to p. 642. SICK FOODS are told about from p. 631 to p. 639.

MANAGEMENT OF LABOR (childbirth) is fully dealt with, giving all necessary particulars, from p. 649 to p. 660.

There are seven INDEXES: 1. P. 921, of *Local Disorders and Injuries.* 2. P. 923, of *Diseases.* 3. P. 928, of *Accidents and Injuries.* 4. P. 929, of *Poisons.* 5. P. 930, of *Classes of Remedies* and of *Sick Foods.* 6. P. 931, of *Medicines and other Remedies.* 7. P. 934, GENERAL INDEX of *all subjects* mentioned in the book. The use of the special indexes will often be convenient, but if a subject is not at once so found, look for it in the GENERAL INDEX.

The GLOSSARY contains definitions of all technical and otherwise out-of-the-way words used in the book. While convenient for ready reference, it is made almost unnecessary by such words being explained where they are used (which is as little as possible) throughout the book. The author has endeavored to write so as to be easily understood by all readers.

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ANATOMY AND PHYSIOLOGY.

A GENERAL VIEW

OF

THE HUMAN BODY:

ITS STRUCTURE AND FUNCTIONS.

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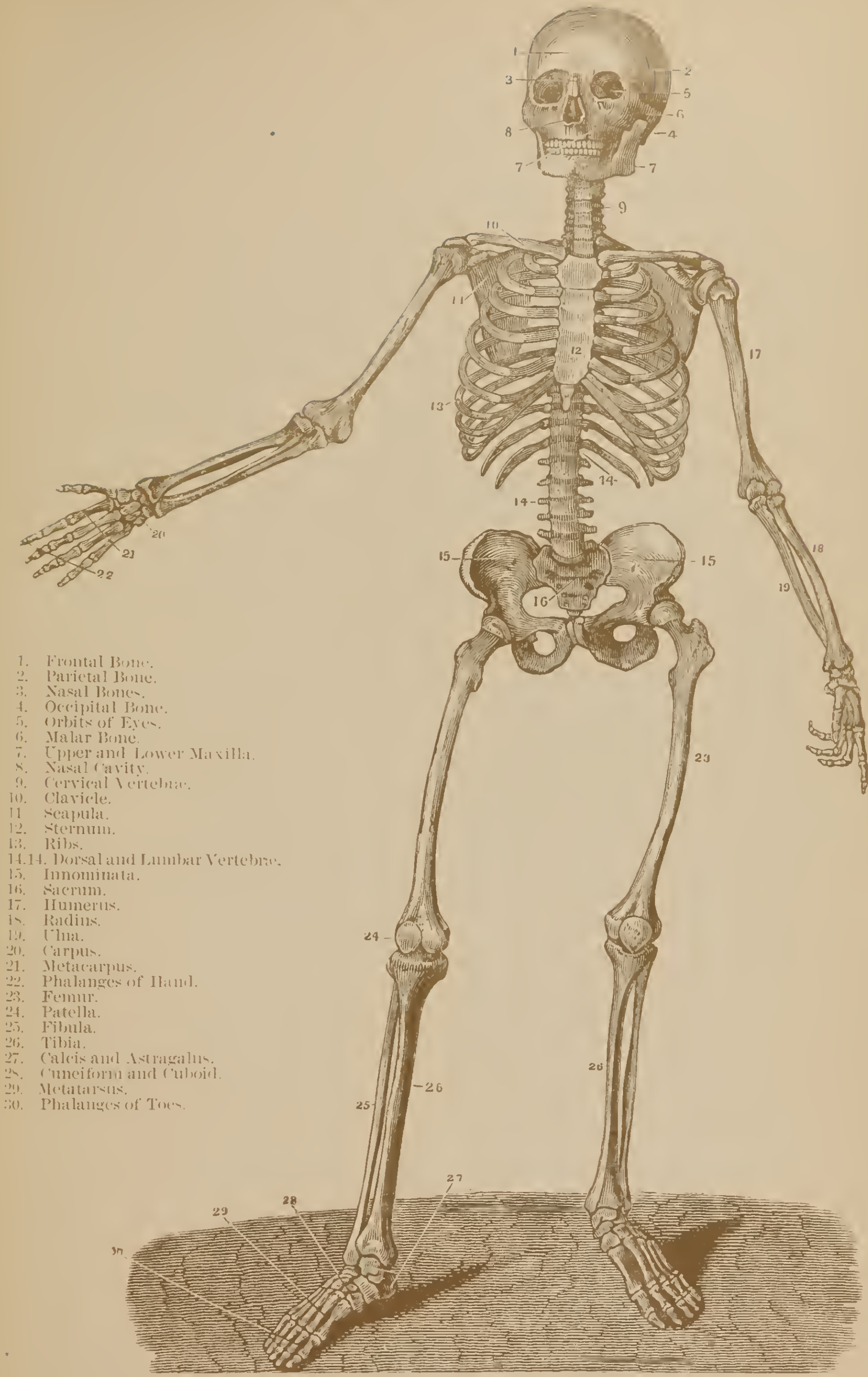


A FRONT VIEW OF THE ADULT SKELETON.

ANATOMY.

OUR purpose in this work is to place before the reader such an account of the living body as will enable any one to understand the essential truths concerning the preservation of health, the causes of diseases, and their management.

Anatomy, with which we begin, is the study of the *parts* or **organs** of which the body is made up, and of the way in which they are *put together*.

We may look upon these parts or organs as consisting of a number of sets, or systems: as the

Bones,	Lungs and Air-Tubes,
Muscles,	Heart and Blood-Vessels,
Skin and Fat,	Reproductive Organs,
Stomach and Bowels,	Brain and Nerves,
Liver, Spleen, Kidneys,	Eye, Ear, etc.

THE HUMAN SKELETON.

Two hundred and six **bones** make up the solid framework of a human body. Of these, twenty-eight are in the head and face; one in the throat; twenty-five in the chest; twenty-six constitute the spine or back-bone; sixty-four are in the shoulders, arms, and hands; and sixty-two in the hips, thighs, legs, and feet.

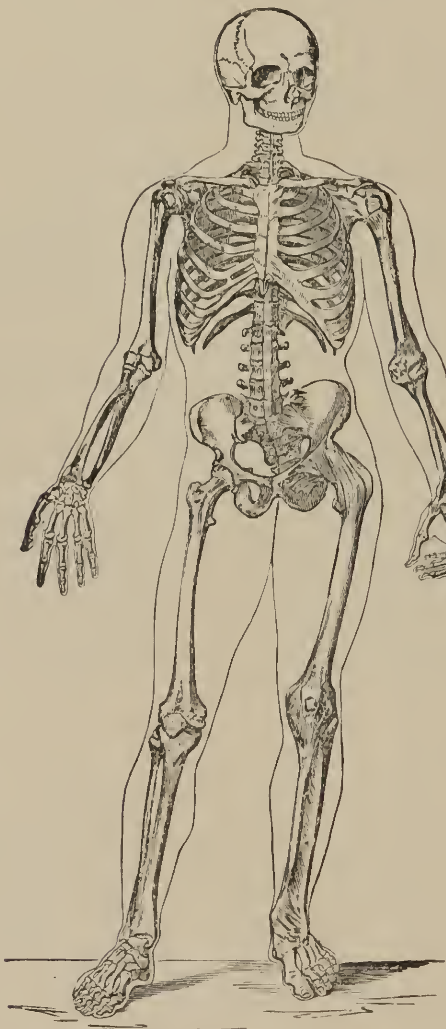
Head, Trunk, and **Extremities** are the natural divisions of the skeleton.

Eight bones make up the skull (**cranium**) of a grown-up person, and fourteen are in the face. Besides these, we count among the bones of the head three *tiny* ones in the interior of the ear, on each side.

The **Spinal Column** (back-bone) in Man consists of twenty-six parts, attached in a sort of chain to each other. In very early (embryonic) life

they number thirty-two or thirty-three parts; but five of these, at the lower portion of the spine, grow together into one bone, the *sacrum*; and, later, the very last three or four (below the sacrum) unite, making the *os coccygis*, which is the rudimentary or undeveloped *tail* of man.

FIG 1.



HUMAN SKELETON.

Each of these links in the spinal chain is called a **vertebra**; all animals having back-bones being called Vertebrates. They constitute the highest division of the Animal Kingdom; with Man at the summit of the whole series.

Between each two *vertebræ* is a piece of thick gristle, or **cartilage.** These elastic pieces act like the springs of a carriage or railway car, preventing jarring in the movements of the body.

FIG. 2.

SPINAL COLUMN.

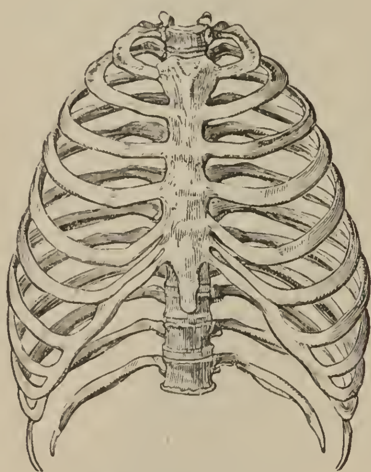
One bone, the **hyoid** or U-shaped bone, in the throat, does not touch any other bone. It forms the base of the root of the tongue, and has several muscles and ligaments attached to it.

The **thorax**, or chest, is made of the breast-bone (**sternum**) in front, **twelve ribs** on each side, and the dorsal part of the **spine** behind. Naturally, it is largest below the middle ribs. Tight-lacing spoils this shape, by narrowing the chest below, to the great disadvantage of the heart and lungs, which are contained within the thorax, injuring the health and often shortening life. Sometimes *sudden* death has resulted from this cause.

Below the chest are the **hip-bones**; which, with the wedge-shaped **sacrum** between them, include the cavity called the **pelvis**.

The *upper extremity* of the body consists of the **shoulder, arm, forearm, wrist,** and **hand.**

Fig. 3.



FRONT VIEW OF THORAX.

For the *shoulder* there are two bones in Man: the *shoulder-blade* (**scapula**) and *collar-bone* (**clavicle**).

Fig. 4 gives a view of the *scapula* or shoulder-blade; the flat portion of it, which rests against the ribs below, and the ridged part above, which makes the shoulder proper.

One can feel either of the *clavicles* or collar-bones easily, in front, in his own person, below the neck, between the shoulder and the upper part of the breast-bone or sternum.

We commonly speak of the "arm" as being all between the shoulder and the wrist. Surgeons and anatomists make the elbow-joint the boundary between the **arm** and **forearm.**

In the **arm** proper there is but one long bone, the **humerus** (Fig. 5).

The head of this bone fits into a shallow socket of the **scapula,** in which it is kept by ligaments and surrounding muscles. Much more

easily, however, than the thigh-bone, the humerus may be, by violent falls or blows, with the arm in certain positions, forced out of place, that is, *dislocated* at the shoulder. Fortunately, it is not so very difficult to replace, if this be attended to soon after the accident.

Fig. 4.

THE SCAPULA.

Fig. 5.

THE HUMERUS.

Fig. 6.

THE ULNA.

Fig. 7.

THE RADIUS.

At the elbow, the humerus connects with the *two* bones of the **fore-arm—ulna** and **radius** (Figs. 6, 7). The *ulna* has the most to do with the elbow-joint.

The *radius* is more widely joined to the small bones of the *wrist.*

No bone in the body is so often broken as the *radius,* because of its getting the main stress of a fall on the hand, naturally stretched out to save the body as one trips and goes down.

Eight small and irregularly rounded bones make up the **carpus,** or *wrist.* This is a very hard joint to dislocate, bound together as the carpal bones are with tough, short ligaments. This is needful, on account of its frequent exposure to violence through the hand.

Fig. 8.

THE WRIST.

Fig. 8 shows also the *beginnings* of the **five metacarpal** (next to

carpal) bones which make the framework of the hand. Although covered by muscles and held close together under the skin, we can easily trace the form of these by feeling for them: one bone for the thumb and one for each of the fingers.

Fig. 9.

THE BONY FOOT.

Every *finger* (digit) has *three* parts or joints; the *thumb* only two. **Phalanges** these are called by anatomists; 1st, 2d, and 3d **phalanx** of each finger; 1st and 2d for the thumb.

The **lower extremity** consists of the **thigh, leg,** and **foot**; with joints at the **hip, knee, ankle,** and **toes.** *The thigh-bone,* or **femur,** is the longest bone in the body.

Two bones, **tibia** (the thicker one) and **fibula** (slender), make the skeleton of the leg. At the knee, in front, is the small round and flat **patella,** or *knee-pan;* which gives protection to the joint.

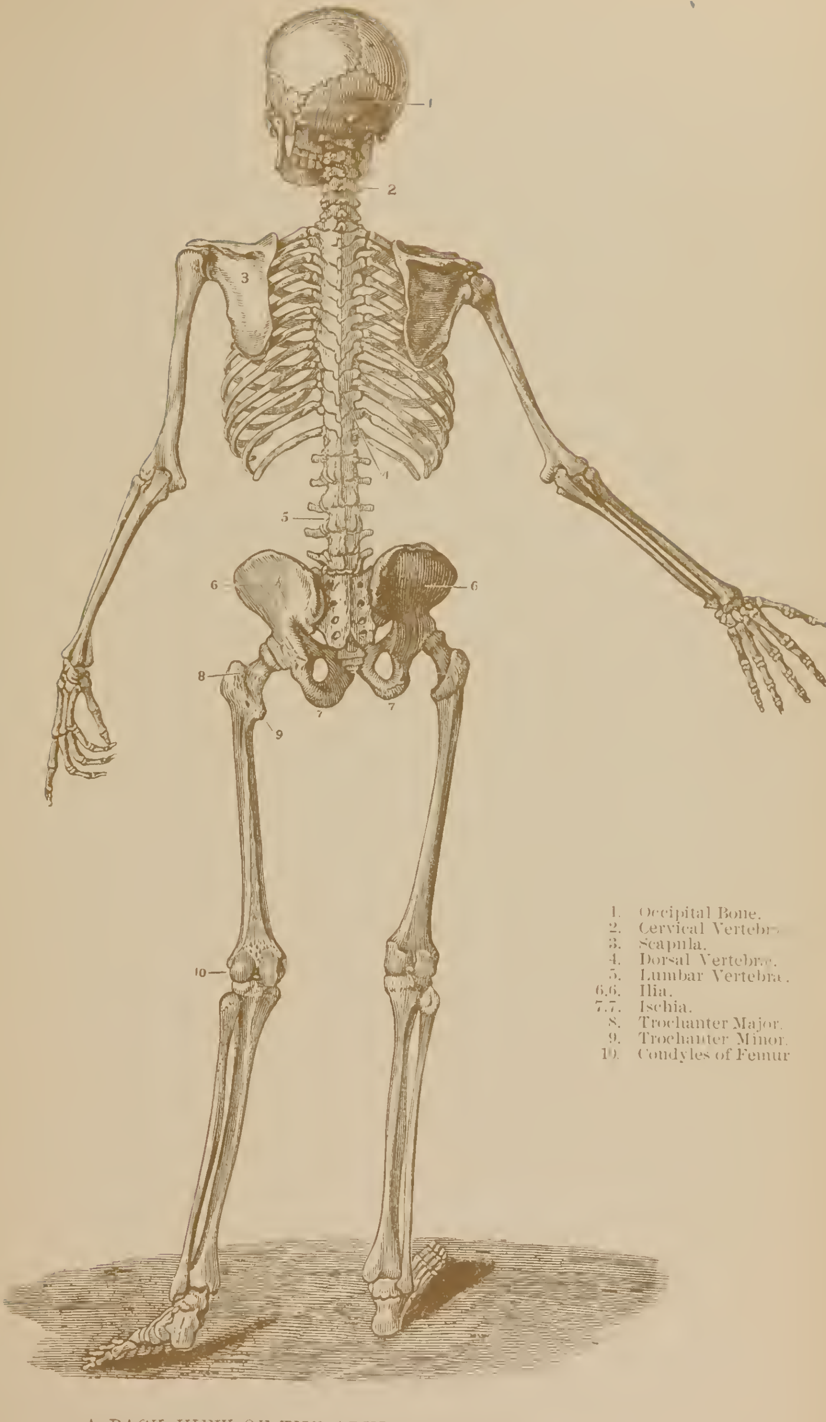
Seven bones constitute the ankle and instep of the foot, called the **tarsus.** The heel-bone, one of these, is called in anatomy the **os calcis.** Next to the instep come the five long, slender, **metatarsal** bones of the foot; and then the toes, or **digits,** with three parts or *phalanges* for each, except the great toe, which has but two (Fig. 9).

JOINTS.

Bones are held together by tough, fibrous **ligaments.** Between their ends, or in the sockets of some joints, are pieces of **cartilage.** There are two principal sorts of joints—more exactly called **articulations**—**fixed** and **movable.** The sutures of the head are examples of fixed or immovable joinings or articulations of bones.

Movable joints are various, as follows: **hinge-joints,** as at the elbow and knee; **ball-and-socket,** as at the thigh or hip-joint; **gliding,** as at the junction of the lower jaw with the temporal bones of the head.

All the other bones which are connected together have their union secured by ligaments, variously (and yet simply) arranged: as, the pieces (vertebræ) of the **spinal column**; the **collar-bone** (clavicle), at one end with the **shoulder-blade** (scapula), at the other with the **breast-bone** (sternum); the **ribs** with the spine, etc.



1. Occipital Bone.
2. Cervical Vertebræ.
3. Scapula.
4. Dorsal Vertebræ.
5. Lumbar Vertebra.

6.6. Ilia.

7.7. Ischia.

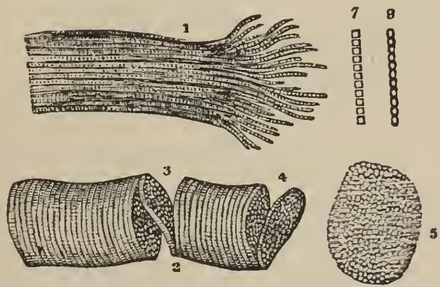
8. Trochanter Major.
9. Trochanter Minor.
10. Condyles of Femur

A BACK VIEW OF THE ADULT SKELETON.

MUSCLES.

Looking at a piece of butcher's meat as it hangs ready for sale, we may see a fair specimen of **red voluntary muscles.** Dissecting one of these lengthwise, we would find it made up of delicate **fibres**; and a microscope would show one of these to be composed of many lesser strands or **fibrillæ**, each of which again is formed of roundish, cell-like bodies, placed end to end, like beads.

Fig. 10.



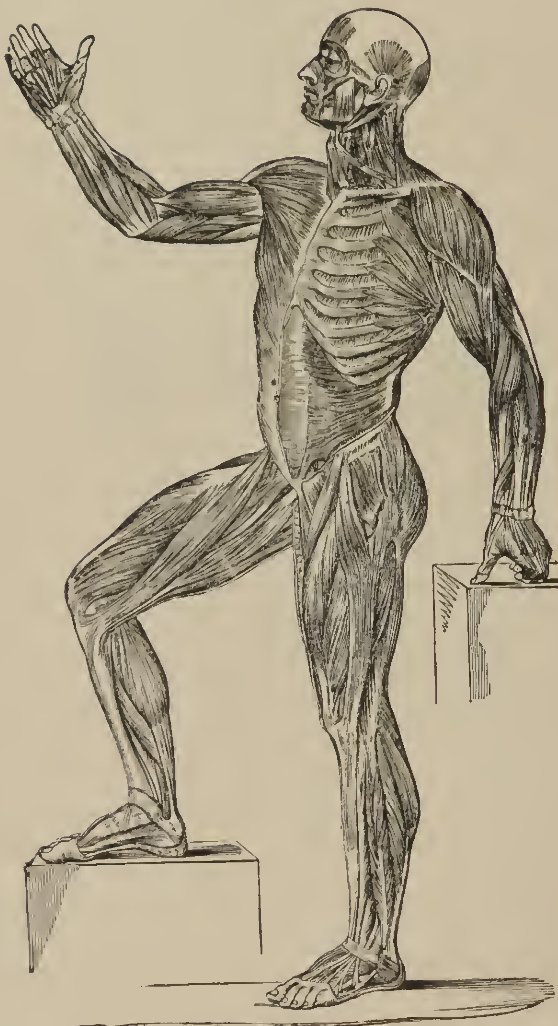
STRIPED MUSCLE, MAGNIFIED.

1. Lengthwise cleavage. 2, 3, 4. Crosswise cleavage. 5. A detached disk of muscle-cells. 7, 8. Separate fibrillæ, formed of cells end to end.

Another sort of muscular tissue, **pale**, almost white, in **bands** rather than fibres, is found in the substance of the stomach and bowels (muscular coat of the alimentary canal), and in the walls or coats of the blood-vessels, especially the smaller arteries. Over these muscular parts the will has no power; their action is **involuntary.** All **red** muscles are **voluntary, except the heart,** and (partially) the breathing muscles, the lower swallowing muscles of the throat, and the muscles of the face by which our feelings are spontaneously expressed. The heart is almost altogether a muscular organ. Its fibres are spirally arranged, and contract regularly by a power residing in them, the exact cause of whose "rhythmic" timing is not very well understood.

As the number of voluntary muscles is very large (between three and four hundred), we will not, in this work, undertake to describe them. Many are long, and thickest at the middle; others are broad, flat, and thin; a few run through or over distinct pulleys, changing the direction of their action. By the **origin** of a muscle, we mean its attachment to a bone or other part at the end nearest to the centre of the body. Its **insertion** is its connection at the farther end; usually to a bone, by a round, white, fibrous cord, called a tendon. Sometimes tendons are flat instead of round. Figs. 11 and 12 show the form and location of a number of the muscles in the body.

Fig. 11.



MUSCLES, FRONT VIEW.

FIG. 12.

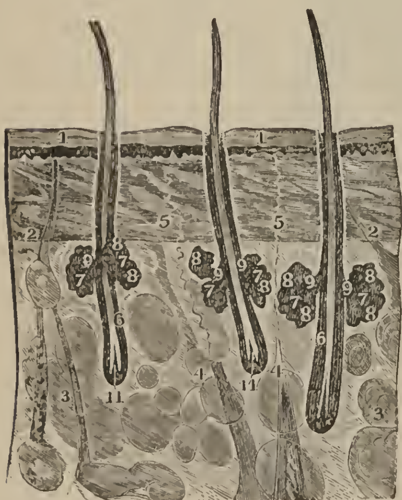
MUSCLES, BACK VIEW.

THE SKIN.

We have a *true skin* (**cutis**), which is laid bare by a blister, and is very sensitive; and over that the protective, delicate, leather-like **cuticle, epidermis**, or scarf-skin. This has no feeling at all; as can be easily shown by clipping it carefully where it is thick, as near the sides of the finger-nails. The tough parts of *corns* and *warts* consist of cuticle.

Of the true skin there are at least two layers; undermost, one composed of a fibro-elastic tissue; and on that another, having a multitude of little elevations on it, giving it a hill and valley character all over. Rows of hillocks, with valley lines between them, are easily seen on the palms of the hands.

FIG. 13.



HAIRS AND OIL-GLANDS.

FIG. 14.

SWEAT-GLANDS AND DUCTS.

Each little hillock (**papilla**) of the skin contains the ending of a tiny branch of a nerve, and a little loop (or more than one) of small blood-vessels. The warmth and nourishment of the skin depend on these vessels; its feeling resides in the nerve-endings.

The epiderm or cuticle (scarf-skin) is formed of layers of flattened *cells* (**epithelium**); seen under the microscope to have that character.

Under the epiderm and upon the *cutis*, or true skin, is the **color-layer**, composed of cells which contain a dark matter. Blondes, as we call fair-complexioned people, have but few of these color-cells. Brunettes, such as Spanish or Italian beauties, possess more of them. Chinese, Egyptians, American Indians, and Mulattoes show still more;

Negroes, and some natives of Southern Hindostan, enough to make them fairly black. But the sun evidently has a good deal to do with the growth of this color-layer; as any one may be *tanned* by summer exposure (*freckles* are tan *spots*), and, by several *years* of tanning, in a hot climate, even a Philadelphian, New Englander, or Englishman may be browned as dark as many mulattoes are.

Glands of two kinds are seated in the skin: **sweat-glands** and **oil-glands.** The latter abound near the roots of the hairs, furnishing them with a natural grease. The sweat-glands are distributed all over the body. Each of these has a curious, long, corkscrew-like tube running up through the skin, by which the drops of perspiration find their way out. A good deal of moisture, however, **transpires**, like a vapor, without gathering in drops. Both kinds, by evaporation, cool the skin. to our great advantage in hot weather and when exercising actively.

Beneath the skin is the common **connective-tissue**; serviceable as a packing material between parts everywhere. In that tissue, near the skin, and also sometimes at quite a distance from it, as around the eyeball, heart, and kidneys, is the **fat.** Over the abdomen, in very corpulent persons, *two inches or more* of this may accumulate.

STOMACH AND BOWELS.

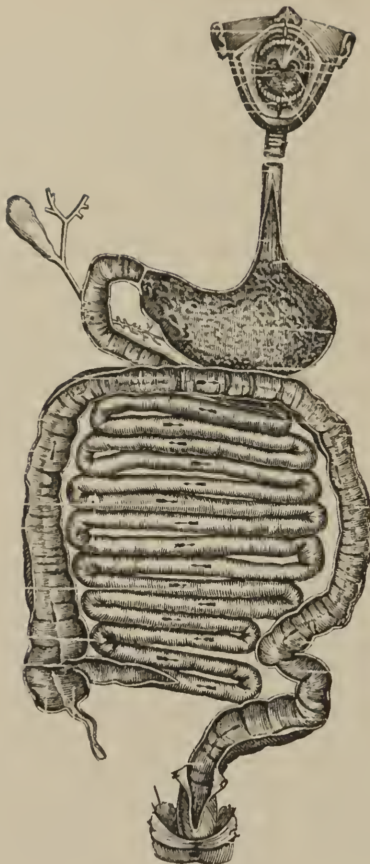
Central in the body, and indispensable to its continued life, is the **stomach**; and, connected with it, the **intestinal canal.** In Fig. 15 is a view of the whole alimentary canal. The **pharynx** is the upper part of the swallowing throat; the lower part is the **œsophagus,** going to the stomach.

The **stomach** is a large sac or bag, shaped something like an old shoe; with the larger end towards the left side. At the right end is the outlet (**pylorus**) from the stomach to the small intestine.

The *first twelve inches* of the small intestine constitute the **duodenum,** into which pours the **bile** from the liver and gall-bladder, and also the **pancreatic juice** from the sweetbread, or pancreas.

The whole length of the *first* or **small intestine** is about twenty feet; of the lower, or **large intestine,** between ten and fifteen feet; making from thirty to thirty-five feet for the length of the bowels of a full-grown man. Occasionally, a tapeworm has been known to live within the intestines until it has acquired more than half the length of the whole canal! This worm is, however, quite flat and thin, and not very wide.

FIG. 15.



ALIMENTARY CANAL.

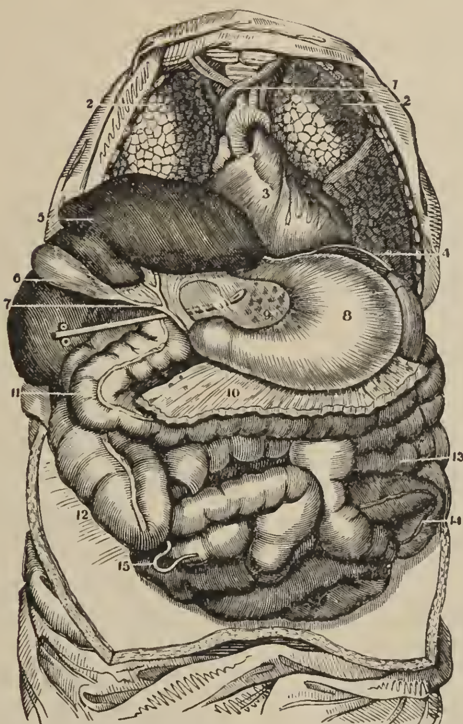
In Fig. 15, the *beginning* of the large intestine is seen at the lower *right* side of the subject; its *termination* (the *anus*) is shown on the left side, below. At the junction of the small and large intestines is the **ileo-colic valve.** Not far above this is the place where there is usually tenderness on pressure in cases of typhoid fever. Sometimes, also, inflammation of the bowels begins near the same region.

FIG. 16.

THE STOMACH.

OTHER ABDOMINAL ORGANS.

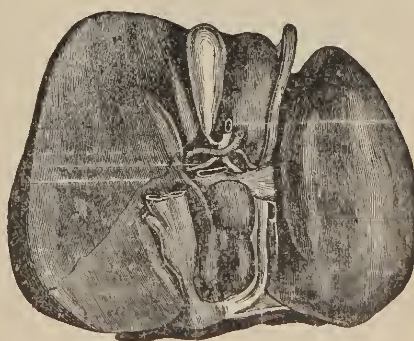
Fig. 17.



INTERNAL ORGANS: THE LIVER BEING TURNED UP AND BACKWARDS.

1. Great Blood-vessels of the Heart. 2, 2. Lungs. 3. Heart. 4. Edge of Diaphragm. 5. Liver. 6. Gall-bladder. 7. Bile-duct. 8. Stomach. 9. Omentum, or caul, cut off. 10. Another portion of Omentum. 11, 12. Colon. 13. Small Intestine. 14. Rectum. 15. Worm-like Appendix.

Fig. 18.



UNDER SURFACE OF THE LIVER.

The **Liver** lies across the body, chiefly but not entirely on the right side, behind the lower ribs. In color and general form, a calf's liver is considerably like it. Underneath it lies the **Gall-bladder.** A tube or duct carries the bile from the Liver to the Gall-bladder, whence it passes out, from time to time, into the *duodenum*, already mentioned as the first portion of the small intestine.

The **Spleen** is a round, flattened gland, a good deal smaller

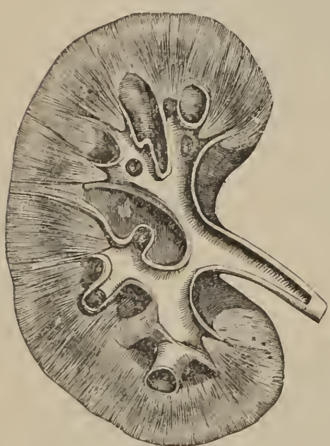
than the liver, and of a stony bluish-red hue. It lies near the stomach, somewhat on the left side. It is often enormously enlarged in persons who suffer with chills and fever; being then called "ague-cake."

The **Pancreas** is a rather long, flat, and thin gland, lying across the middle of the body, just below the stomach. It has a tube or duct, which empties into the Duodenum, near the entrance of the bile-duct, which comes from the Liver and Gall-bladder.

The two **Kidneys** lie, one on each side, far back in the abdomen, between the ribs and the hip-bones (ossa innominata).

The Kidney is dark-red in color, containing, especially near its outer surface, many small blood-vessels (capillaries) full of blood. Its shape is very much that of a "kidney bean;" its length, about four inches; width, two, and thickness an inch or so, in the adult. Out of it proceeds the **ureter**, a tube through which the urine flows to the **Bladder**.

Fig. 19.

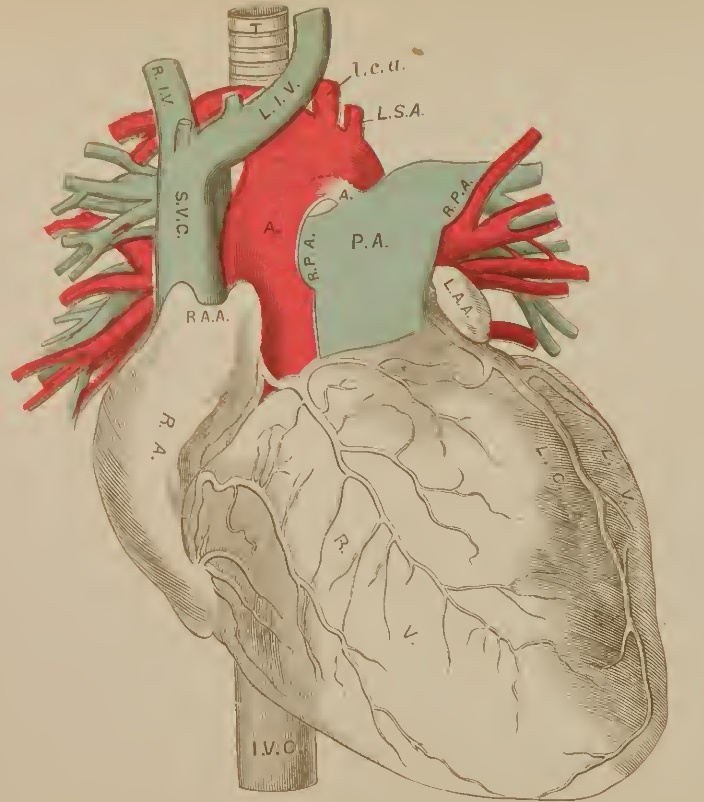


THE KIDNEY, LAID OPEN.

Fig. 20.

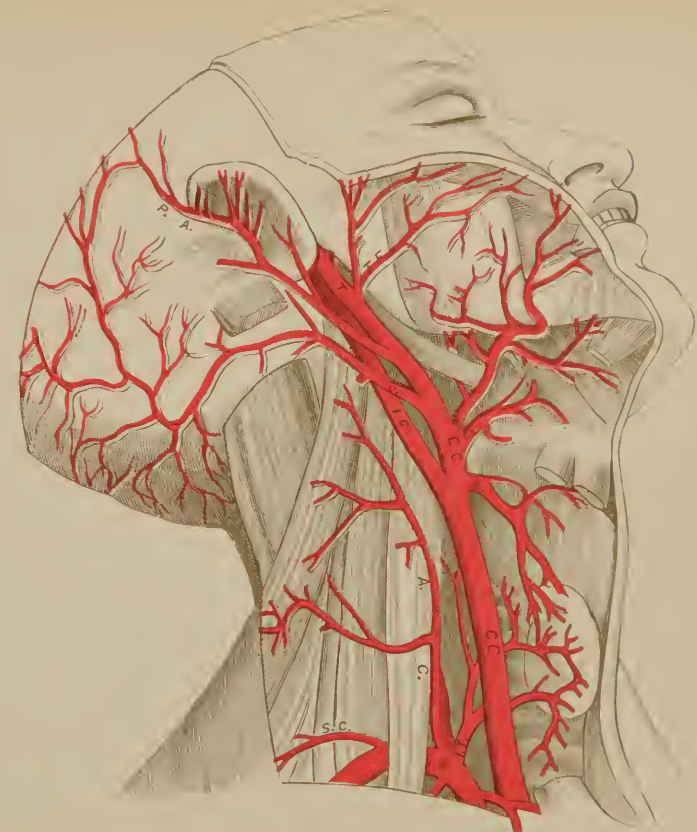
THE KIDNEYS, URETERS, AND GREAT BLOOD-VESSELS.

The **Bladder** rests in front, below the intestines, just behind the bony ridge of the *pelvis*. From the Bladder the urine escapes through a tube called the **urethra**.



HEART AND HEART VESSELS.

T. Trachea (Windpipe)	I.V.C. Inferior Vena Cava.	R.R.A. R. Auricular Appendix
R.I.V. R. Innominate Vein.	A. Aorta.	L.A.A. L. Auricular Appendix
L.I.V. L. Innominate Vein.	A. Ductus Arteriosus.	R.A. Right Auricle
l.c.a. Left Carotid Artery	R.P.A. R. Br. Pulmonary Artery	L.V. Left Ventricle
L.S.A. Left Subclavian Artery	P.A. Pulmonary Artery	R.V. Right Ventricle
S.V.C. Superior Vena Cava		L.C.A. Left Coronary Artery



ARTERIES OF THE HEAD AND NECK.

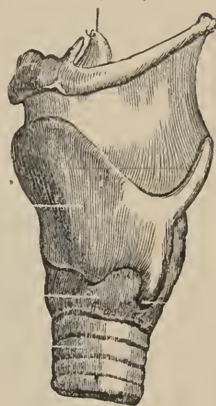
P.A. Post'r Art. of the Ear	E.C. Ext'r Carotid.	C.C. Common Carotid
T. F. Trans Facial	F. Facial.	A.C. Ascending Cervical
T. Temporal	L. Lingual.	S. Subclavian
O. Occipital	S.T. Sup'r Thyroid	S.C. Superf. Trans. Cervical
I.C. Int'r Carotid	I.T. Inf'r Thyroid	

BREATHING ORGANS.

In Man, these are the **windpipe, lungs,** breathing **muscles,** and the blood-vessels and nerves connected with these.

Through the nostrils or the mouth air enters the **Larynx.** We can feel this, or see it in another, where the "Adam's apple" is in a man's throat. The Larynx is the organ of **voice**; hence it is larger and less simple than if it were only to breathe through. Below the Larynx is the **Trachea,** chiefly composed of *cartilaginous rings;* and this branches into the two **Bronchial** tubes, one going to each Lung.

Fig. 21.



THE LARYNX.

The **Lungs** are light, spongy organs, pinkish slate-colored, which fill up almost all the space within the chest not occupied by the heart and great blood-vessels. After death, a healthy lung crackles softly when pressed by the hand; and will float on water, on account of the air contained in it.

Six hundred millions of air-cells, it is calculated, make up, with the little tubes joining them, the two lungs of a grown person. Each cell is about the one hundredth of an inch in diameter. The right lung consists of three portions, called *lobes.* The left lung has but two lobes.

HEART AND BLOOD-VESSELS.

Our blood is circulated throughout the body by the **Heart, Arteries, Capillaries,** and **Veins.** Another set of vessels carry along the white or colorless liquids called **lymph** and **chyle**; those vessels being called **Lymphatics** and **Lacteals.** Of the latter, more hereafter.

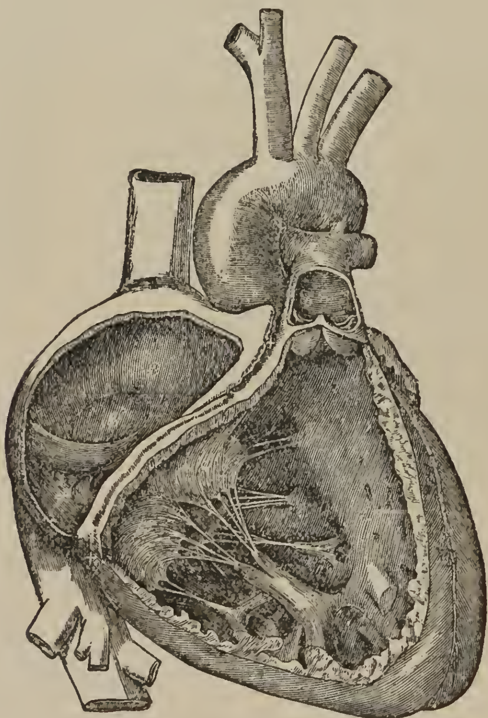
A man's heart is about the size of his fist. It is *two hearts in one;* that is, one half has its entrances and exits quite separate from those of the other half. Again, each half-heart has two chambers; an **auricle** and a **ventricle.** We have, then, the **right** auricle and ventricle, and the **left** auricle and ventricle, built against each other, like twin houses. The right half of the heart is almost all in front of the other half.

The heart is placed behind the breast-bone (**sternum**), with its larger end upwards, and its tip (**apex**) pointing downwards and to the left. As its larger and stronger parts (ventricles) press out the blood from themselves into the great arteries, the heart-tip *beats* against the chest-wall, under the fifth rib.

Into the right auricle enter two large **veins**, the largest in the body, one from above and the other from below. These bring all the blood of the body back to the heart. The right auricle opens into the right ventricle. From the right ventricle a large vessel, the **pulmonary artery**, passes out, and branches into the two lungs.

Four veins from the lungs (**pulmonary veins**) enter and carry the blood into the left auricle. This opens into the left ventricle. Out of the left ventricle goes the **aorta**, the largest artery of the body; whose branches supply all parts of the system with blood.

FIG. 22.



THE HEART, LAID OPEN.

Over the Heart is a covering sac, called the **Pericardium.**

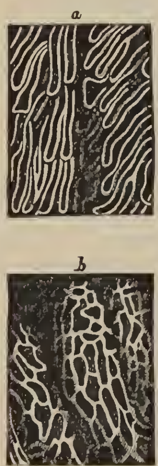
The **Aorta** forms an arch above, and goes down behind the heart (Fig. 22). It gives off branches all along, and descends in front of the back-bone (vertebral or spinal column). Right alongside of it lies the great vein (**vena cava**), which carries the blood from the lower part of the body and pours it into the right auricle.

There are a great many arteries in the body. You can know where one lies by its **pulsating** or beating, like a little heart. There are still

more veins, many of them right under the skin, where they can be seen, of a bluish color, as on the back of the hand. When an artery is cut, **bright-red** blood flows, with a **jerking**, pulsating spurt, a great deal of blood escaping in a short time. If a **vein** is cut, dark, **blue-black** blood comes out, with a **steady** flow. From a large vein, as the **jugular** of the neck, enough may come to cause death in a little while; but from a small vein much less, and it is more easily stopped by pressure than when an artery is wounded.

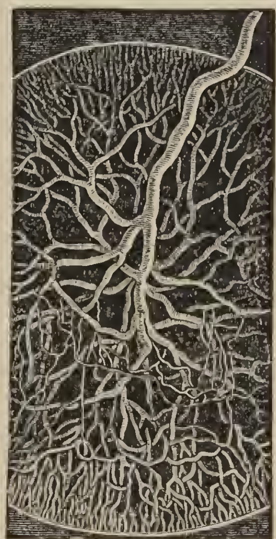
One simple rule will enable any one to judge *where* the principal artery of each part of the body lies. *The artery is always in the* **safest** *possible place* which its destination allows.

Fig. 23.



CAPILLARIES.
a, Of the skin of a Finger; *b*, of the Small Intestine.

Fig. 24.



CAPILLARIES OF A TOOTH.
(Much Magnified.)

Capillaries receive their name from their being smaller than a hair. Some of them are not more than the 3000th of an inch in diameter. They are arranged variously in different parts of the body.

Veins receive the capillaries as rivers do rivulets emptying into them. Small veins then join to make larger ones, till at last all unite in emptying into the great **ascending** and **descending** veins (**venæ cavæ**), which pass from below and above into the **right auricle**. Some veins are deep-seated, companions to the arteries; others are at the surface, and can be readily seen. Nearly all the **veins** have **valves** along their course, by which their blood is prevented from flowing backwards. All blood-movement in the veins must therefore be towards the heart. None

of the arteries have valves, except, as before said, just at the origins, in the heart, of the pulmonary artery and the aorta.

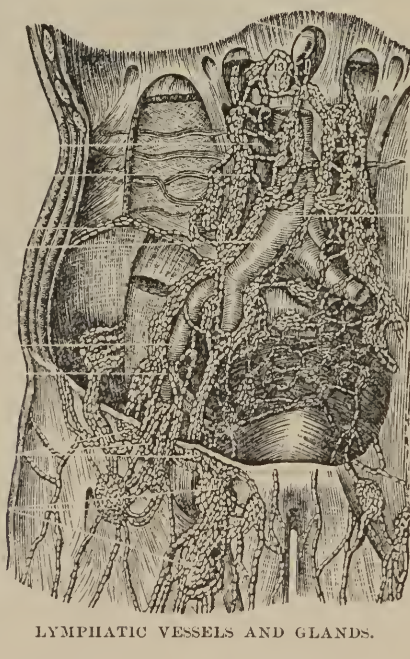
One exception there is, in regard to veins always joining to make

Fig. 25.

LACTEALS AND LYMPHATICS.

larger and larger trunks. There is a large vein in the centre of the body, called the portal vein, receiving blood from the stomach, small intestines, and spleen, which divides up into capillaries. These then

Fig. 26.



LYMPHATIC VESSELS AND GLANDS.

go through the liver, and are again united into a vein (*hepatic* vein), which runs out from the liver into the great ascending trunk (vena cava).

Lymphatic vessels are distributed all over the body, except in the brain, spinal marrow, and a few other parts. They are small and delicate (except the two large *ducts* which receive the rest), and contain a colorless fluid, called **lymph.** Those of the small intestines, however, convey a milk-like fluid called **chyle**; and *these* vessels are named **lacteals.**

Most of the lymphatics and all the lacteals empty into the **left thoracic duct.** This passes up through the abdomen and chest (*thorax*); to discharge its contents into the **junction** of two large veins, one from the arm and the other from the neck (**subclavian** and **jugular** veins). There is a much shorter similar thoracic duct on the right side.

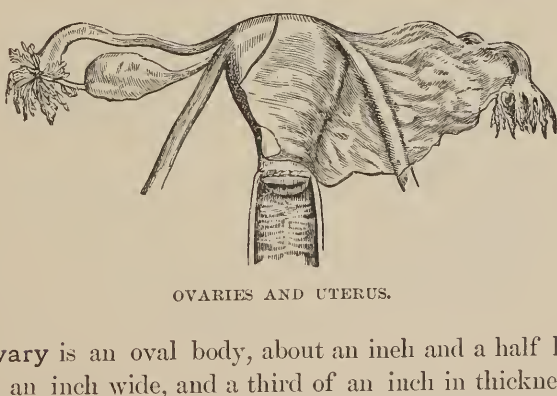
All along the course of the lymphatic vessels are small flat and round "kernels," the **lymphatic glands.** They are most numerous in the deeper part of the abdomen, in the arm-pit, the neck, and the groin. When healthy, they are not large and hard enough to be seen or felt; but when diseased, they sometimes become quite large and conspicuous.

ORGANS OF REPRODUCTION.

Our purpose will be here best served by giving a very brief account of some of the organs (chiefly internal) which are essential to the continuance of the species. Those of the female system are the **Ovaries** and the **Uterus.**

There are two Ovaries, one on each side, suspended in the "broad ligament" of the Uterus.

Fig. 27.



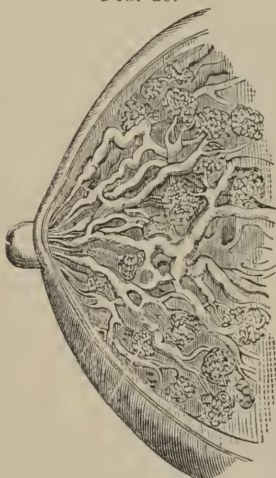
OVARIES AND UTERUS.

Each **Ovary** is an oval body, about an inch and a half long, three-quarters of an inch wide, and a third of an inch in thickness. In the free margin of the *broad ligament* there is on each side a tube, four inches long, opening at its inner end into the body of the Uterus. The

outer end of each duct widens out, and is *fringed* (see Fig. 27). Ordinarily, this end opens into the cavity of the abdomen; but at certain periods it presses upon the ovary, so as to receive from its surface a discharged **ovum.**

The **Uterus** is a pear-shaped body, broadest above, suspended by its ligaments in the **pelvis**; that is, the lowest portion of the trunk. It is about three inches long, two inches wide at its upper part, and an inch thick. When in its right position, its upper end is directed upwards and somewhat forwards; its lower end, downwards and slightly backwards. Behind it is the bowel (*rectum*), and before it the bladder. Anatomists speak of the *fundus* or *body*, the *cervix* or *neck*, and the *os* or *mouth* of the Uterus.

FIG. 28.



MAMMARY GLANDS.

The **Mammary gland,** or *breast,* is a part of the reproductive system, being designed for the nourishment of offspring.

It is composed of a great number of cells, in which milk is secreted from the blood. These open into tiny tubes, which unite to form larger ducts, making of these at last fifteen to twenty **lactiferous ducts.** All these converge to the *nipple*, where the milk is supplied to the infant after its birth. The mammary glands commonly grow much larger at the approach of maternity.

BRAIN AND NERVOUS SYSTEM.

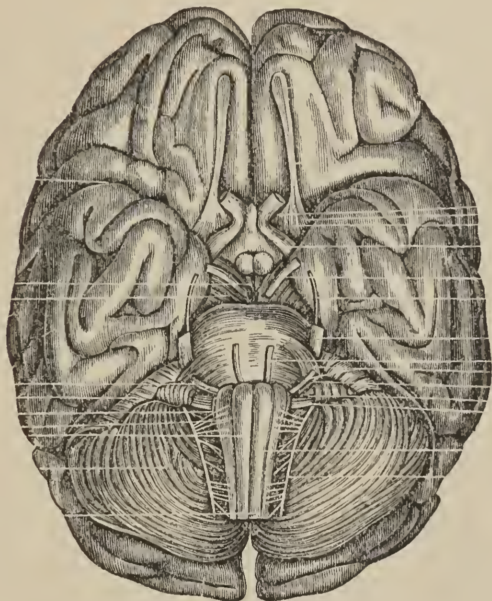
All **vertebrate** or back-boned animals, among which man is the highest in the scale, have a **Brain,** a **Spinal Cord, Ganglia** (nerve-centres), and **Nerves.** Man's brain is much larger in proportion to his body than that of the most manlike Apes, such as the Gorilla, Orang-Outang, and Chimpanzee.

Nearly the whole cavity of the skull in man is filled with the Brain. It is made up of a *greater* and a *lesser* brain (**cerebrum** and **cerebellum**). Each of these is in two halves or hemispheres; but the division is deepest between the right and the left half of the upper, front, greater brain, *cerebrum.*

Three membranes wrap and protect the brain; an outer tough, fibrous one (**dura mater**) next the skull; then a thin layer (**arachnoid**),

always moist, like the *pleura* which wraps the lungs; innermost, very close to the brain, the delicate **pia mater**, almost all made up of blood-vessels.

Fig. 29.



UNDER SURFACE OF THE BRAIN.

Convolutions, that is, *in and out winding* irregular channels, cover the whole surface of each hemisphere of the greater brain in Man. So they do also in Apes, Lions, and many other animals; but *some* ani-

Fig. 30.

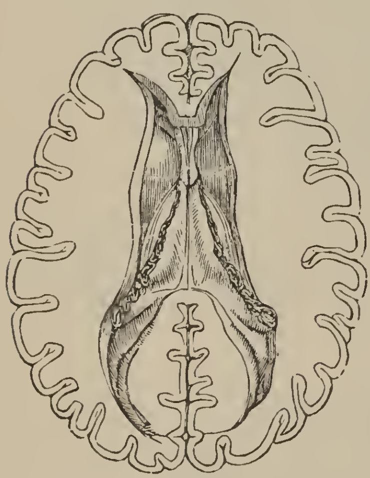
ONE HEMISPHERE OF THE CEREBRUM.

mals are *smooth-brained.* Man has the greatest number of convolutions of all. They might, from their appearance, be imagined to be made

by the brain growing almost too large for the skull, and so becoming *wrinkled*, as clothes do when packed in a trunk without being folded.

Anatomists speak of three **lobes** or portions of the cerebrum, one behind another; but these, as well as the inner structure of the brain, need to be described only in a technical or professional study of the subject. We may say here merely that, while the **outside** part of each hemisphere, where the convolutions are, is composed mostly of **gray nerve-cells**, much the greater part of the cerebrum is of **white** nerve-substance; and this, when examined with the microscope, is seen to be made up of myriads of tiny **tubes**; the same as those of which the *nerves* are constituted, all over the body. About a dozen **pairs** of **nerves** are connected with the base or lower part of the cerebrum. Among them are the **optic** nerves, for the eyes; **olfactory** nerves, for the nostrils; **auditory**, for the inner ears; one pair for the muscles of the face; another pair for the tongue, etc. Several of these are shown at their beginnings in Fig. 33.

Fig. 31.



AN INSIDE VIEW OF THE BRAIN.

The **cerebellum**, or lesser brain, is behind, and, in Man, though not in all animals, below the cerebrum. It is, in Man, considerably smaller than the latter. Instead of convolutions, it is marked outside with lines, and within, when cut open, it has a branched appearance, fancifully called by some old anatomists the *tree of life*. It has no more, really, to do with life than the rest of the brain.

Out from the cerebrum, and partly also from the cerebellum, there passes down the beginning (**medulla oblongata**) of the **spinal cord** (medulla spinalis).

The **Spinal Cord**, or *Spinal Marrow*, extends all the way down the back, encased within a channel immediately behind the bodies of those pieces of the back-bone called *vertebræ*. Nerves which go in and out through the small holes on each side of the back-bone, are shown in Fig. 34. These spinal nerves carry messages, so to speak, between the brain and the hands, feet, and other parts. Were any of them cut across, some parts of the body would be deprived of feeling and of the power of motion.

In Fig. 33 we have a view of the two **optic** nerves; which are peculiar in joining and crossing each other between the brain and the eyes.

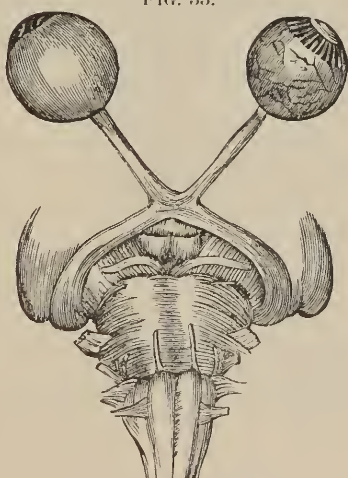
Almost all the nerves are **white** and cord-like; they branch, so as to become smaller and smaller, and their final ends are connected with muscles, the eye, ear, skin, or other parts.

Fig. 32.

HALF OF THE CEREBELLUM AND PARTS NEAR IT.

Ganglia are little *knots* of gray nerve-*cells*, scattered about in different parts of the body, but always having nerves connected with them. They are **nerve-centres**. Oysters, clams, and cuttle-fishes have no brain nor

Fig. 33.

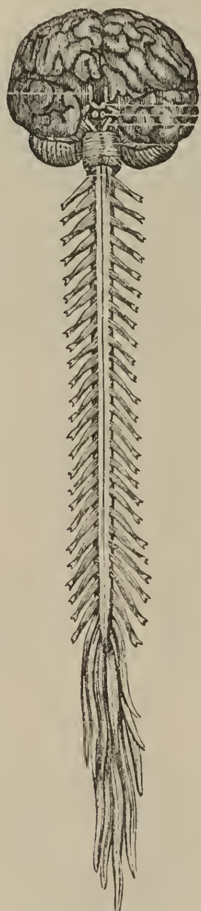


THE OPTIC NERVES.

spinal marrow; only *ganglia* and *nerves*. Insects and worms also are without brains, or any real spinal cord; but their ganglia are laid in a double line, something like the spinal marrow in form.

The most regular arrangement of **ganglia** in Man is in a double row, on the two sides of the back-bone (spinal column), outside of it. These ganglia have nerves *connecting* with the **spinal** nerves, and they send branches also to the great organs within the body (stomach, liver, spleen, heart, lungs, kidneys, ovaries, uterus) and to the arteries, which have

Fig. 34.



BRAIN AND SPINAL CORD TOGETHER.

no other nerves. Moreover, there is a small **ganglion** on each of the **hindmost** of the two **roots** which every spinal nerve has.

Behind the stomach lie the largest ganglia in the body, called, from their half-moon shape, the two **semilunar** ganglia. Near them is a great *mesh* (*plexus*) of nerves, called the **solar plexus.** Because of their close connection with the spinal marrow, and also with the heart,

lungs, stomach, and other central organs, a severe shock to these ganglia is felt all over the body. That is the reason why a heavy blow upon the pit of the stomach may even kill at once.

Anatomists have long been accustomed to call these ganglia and their nerves the **Great Sympathetic** System. They do connect a great many

FIG. 35.

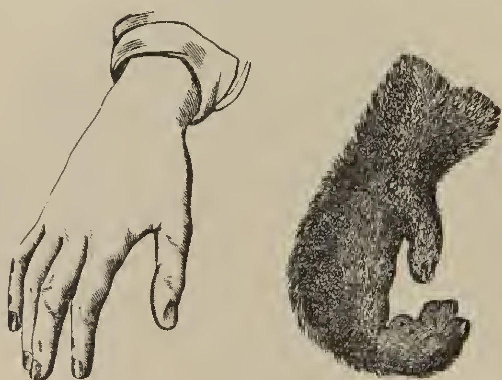
NERVES OF THE BODY.

parts together; yet as *feeling* belongs not to them, but to the *brain, spinal cord*, and their nerves, and these ganglia are most related to the central organs of digestion, circulation of the blood, etc., the best name for them and their attachments is, the **Ganglionic System of Organic Life.** (See PHYSIOLOGY.)

PHYSIOLOGY.

Physiology shows the **actions** and **uses** of those parts of the body (called **organs**, or *instruments*, their fabrics being called the **tissues**) whose shapes, sizes, and places in the system are set forth in **Anatomy.**

FIG. 36.



HAND OF MAN AND GORILLA.

Two sets of **functions** or operations are performed by different organs or instruments in the body. One set, being exceedingly like functions performed also by plants, are called **vegetative** functions; the others, peculiar to animals (including Man), are termed **animal** functions.

Of the first set there are:

Digestion,	Respiration,
Circulation,	Excretion,
Growth,	Reproduction.

Of the second set:

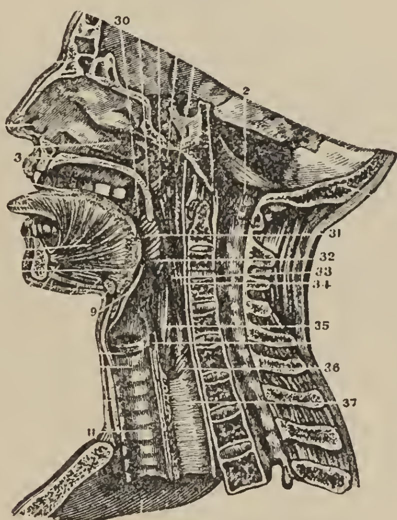
Sensation,	Intellection,
Spontaneous Motion,	Emotion.

HOW WE TAKE FOOD.

Man's teeth are in part like those of carnivorous animals (dog, cat, lion), being sharp all around in front; but our back jaw-teeth (**molars**) are more like those of the ox and horse, fitted for chewing our food.

What is chewing for? It is to break up and soften our food, and mix it with the **saliva** of the mouth. This makes it more easy to swallow, and **begins** its **digestion.** Much of our vegetable food (such as bread, potatoes, peas, beans, etc.) consists chiefly of starch. Now the saliva acts upon moist, warm starch, changing it somewhat. That particular change, the beginning of digestion, being less active while the food is in the stomach, goes on faster and is ended in the small intestine.

Fig. 37.



SECTION OF HEAD AND NECK.

2. Canal for Spinal Marrow. 3. Hard Palate. 9. Epiglottis. 11. Trachea. 30–34. Muscles of Pharynx. 35–37. Œsophagus.

Swallowing is done in the gullet (**pharynx** above, **œsophagus** lower down) by its *muscles.* The first part of the act of swallowing we can manage by an act of the will; after the morsel is down apiece, it *will* go farther, in spite of us. Even at the beginning it sometimes needs "coaxing," so to speak. A small pill is harder to swallow than a large one; because it does not stimulate (wake up) the swallowing muscles of the throat so well. Put the pill into a mouthful of jelly, or place it far back on the root of the tongue, and then take a drink of water,—and down it will go.

DIGESTION.

In the stomach is secreted (chiefly just after food has been taken) the **gastric juice.** This is an **acid** fluid, containing a substance called **pepsin** (from a Greek word meaning *digestion; dyspepsia* is bad digestion). It dissolves and changes, that is digests, the **lean** part of meat, the pasty part (**gluten**) of bread, and the cheesy part (**casein**) of milk. The **fatty** portion of our food scarcely begins to be digested till, after being made into **chyme,** it all passes out through the **pylorus,** from the stomach into the small intestine. Into the beginning of this, the **duodenum,** pour the **bile** from the liver, and the **pancreatic juice** from the pancreas. By these fluids, in the small intestine, the process of digestion is completed.

ABSORPTION.

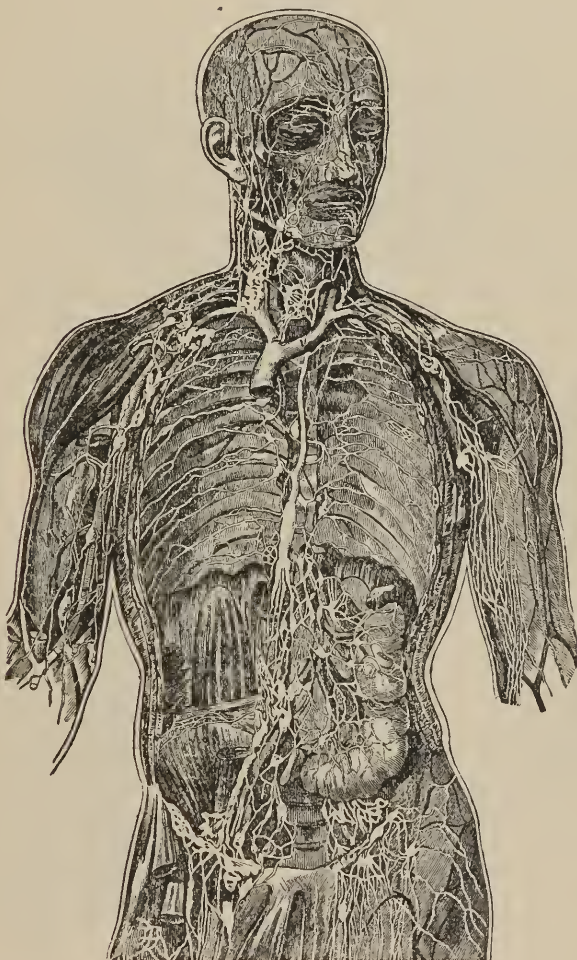
Before food which is digested in the stomach goes from it (through the *pylorus*) into the duodenum, it is converted into **chyme.** Part of it, entirely dissolved, is soaked up, **absorbed,** by the small blood-vessels (capillaries) of the stomach, and is carried by these and larger blood-vessels (veins) into the general circulation. A good deal of the blood from the stomach (and also from the small intestine) goes through the **portal** vein, into the liver. In this blood there is conveyed to the liver a large amount of nourishing material, which afterwards passes into the general circulation.

Chyme, acted upon in the small intestine, is changed to **chyle.** This is a milky fluid, which is taken up, very much as the small rootlets of plants take water from the ground, by vessels called **lacteals.**

All the lacteals empty into the **thoracic duct** (see **Anatomy**), a tube which ends at the junction of two large veins at the upper left side of the chest, just below the throat. Thus the chyle gets into the blood. But, all along their track, the lacteals go through small round, flat bodies (made of *cells*), called the **mesenteric glands.** These act upon the chyle, changing it, so that it becomes more like blood. This kind of change is called **assimilation.** Blood going through the liver and spleen also seems to be *assimilated*, that is, made like or similar to the tissues of the body; and the glands scattered along the other absorbent vessels, called the *lymphatics* (see **Anatomy,** under **Circulation**), assimilate the lymph, which they take up everywhere in the body, to the **blood-lymph,** which nourishes all the tissues.

Nourishes; what does that mean? Does not eating directly nourish? Not exactly. It prepares food to become nourishment; and so does digestion. Absorption then brings it, thus prepared, into the blood; and *the blood directly nourishes all parts of the body*. It is meant by

Fig. 38.



THE LACTEALS AND LYMPHATICS.

this that, as every part is alive, *growth* and *waste* must be provided for by *new* material.

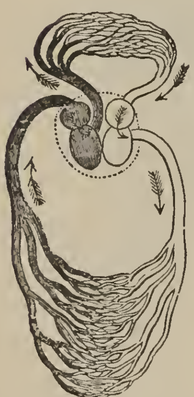
That any part of the body, as bone, muscle, or brain, shall grow and keep healthy and strong, needs several conditions. 1. It must have a sufficient supply of blood. 2. The blood must be of a good quality.

3. There must be also a supply of **nerve-force**, through connection with a healthy nervous system. 4. The part or organ must have its natural and proper share of use or **exercise**. 5. Between the periods of exercise there must be time enough for sufficient **rest** for the repair of waste.

CIRCULATION OF THE BLOOD.

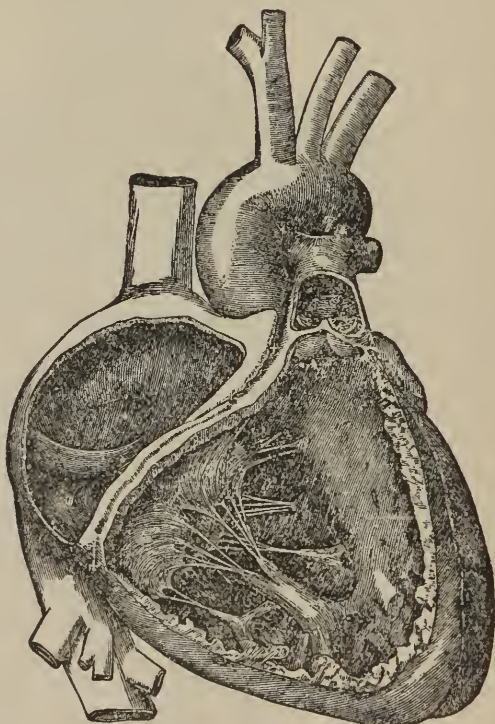
Beginning at the **right ventricle** of the heart (see **Anatomy**), the blood passes thence to the **lungs**. Thence, after being aired, it returns

Fig. 39.



PLAN OF THE CIRCULATION.

Fig. 40.



A HUMAN HEART, LAID OPEN.

to the **left auricle**. This pours it into the **left ventricle**. Out of that cavity it goes into the great **aorta**, the main artery of the body.

Between each auricle and its attached ventricle there are bands and cords, making a sort of doors or **valves**, shutting behind the current of blood when it passes from the auricle to the ventricle, and preventing its return. Some of these are shown in Figs. 40 and 41.

At the beginnings of the **aorta** and **pulmonary artery** (the latter going to the lungs) there are **three-pocketed** valves, called **semilunar,** from the half-moon shape of the pockets.

When the heart acts during life, **two** of these great valves are always **open,** and **two** of them **shut.** As the *ventricles,* right and left, squeeze out their contents into the great arteries (pulmonary and aorta), they

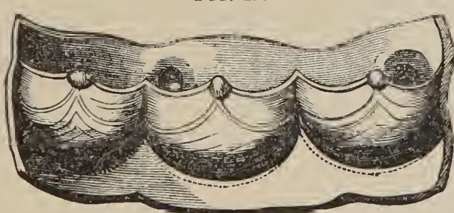
FIG. 41.

HEARTS CUT OPEN, SHOWING THE VALVES OPEN AND SHUT.

close the *membranous* valves behind them, and at the same time the *semilunar* valves of the arteries are *open.* Then the ventricles relax; the semilunar *arterial* valves are *shut* by the back-pushing blood current, and the membranous *auriculo-ventricular* valves are *open,* allowing the blood to pass from the auricles into the ventricles.

The heart in man, all mammals and birds, might be described as **two**

FIG. 42.



VALVES OF THE AORTA, SPREAD OPEN (MAGNIFIED).

hearts laid together, like irregular "twin houses." The **right** heart (composed of auricle and ventricle) takes **venous** blood and sends it to the **lungs.** The **left** heart (auricle and ventricle) receives **aired** blood from the lungs, and sends it **over the body,** through the aorta and its branches. From those branches it is divided up among the **capillaries** (smallest blood-vessels), and they give it to the **veins.**

Through the veins, joining together like branches of a running stream, the blood is at last (by the **venæ cavæ**) returned to the heart.

Muscle (red, striped) makes up the substance of the heart. It never stops acting, whether we are sleeping or waking; taking no rest, except in the short pauses, one of which occurs after each beat, before the next begins.

When the ventricles contract, the tip (**apex**) of the heart knocks gently against the inside of the chest, just below the fifth rib. As we feel this, we call it the **impulse** of the heart. If you put your ear on any one's chest, right above where the heart is felt to beat, or a little nearer to the middle of the breast-bone, **two sounds** will be heard, lub-dup, lub-dup; the first the loudest and strongest. These are of much importance to physicians, in judging about disorders of the heart.

A grown man's heart beats, on the average, when quiet and in health, seventy times a minute; a woman's, seventy-five times. There is no harm, however, in a **pulse** (as we call it when counted at the wrist) beating only sixty times a minute. Exercise, great heat, emotion, or stimulating drink, may hurry it up to more than a hundred per minute in any one. Standing, it is most rapid; a little slower, sitting; slowest, lying down.

Infants have pulses of a hundred or more beats per minute while perfectly well. Old people have the pulse slower than those of middle age, until they come to be *very* old, when it may be weak and rapid.

Fever is always attended by a **rapid** pulse. Opium poisoning, apoplexy, and compression of the brain from a broken skull, are marked commonly by a **slow** pulse. When one becomes very feeble, especially from long illness, the pulse is **small** and *rapid.* Dying persons most generally have a rapid, thready, small, weak pulse.

The **arteries** have each three coats: the outer one tough and fibrous, the innermost thin and very smooth; the middle one both muscular (white, **unstriped** muscle) and elastic. When blood is pushed into the arteries by the heart, they **contract** upon it; and so help to carry it farther, into the capillaries, and, through them, into the veins.* As the most assistance to the movement of the blood is wanted at the greatest distance from the heart, so the **most muscular** arteries are the **smallest** branches. By these, the amount of blood given to different parts is regulated according to their needs.

---

* Many physiologists do not acknowledge that the arteries assist the heart in forcing the blood onwards; thinking that they regulate its flow merely by resisting it, more or less But, after much study of the subject, the author is satisfied that the above account is correct.

Veins are easily seen on the back of any one's hand. They do **not** beat or **pulsate** like the arteries. In them the blood flows **towards the heart**; and there are **valves** along their course (which the arteries do not have) keeping the blood from going back again. Exercise of the muscles, by pressing on the veins, helps forward the circulation of the blood in them. Whales, reptiles, and fishes have no valves in their veins. As arteries have no valves, muscular pressure acts on them *both ways*, forwards and backwards; although in them the current onward is stronger. Several arteries go through long channels, which protect them from pressure. This is the case with the **vertebral** artery at the back of the neck on each side; it runs through holes in the side projections (*processes*) of the pieces of the back-bone (vertebræ) of the neck.

The whole bulk of the veins is three times that of the arteries. The blood moves, therefore, much more slowly through the veins. Altogether, it takes about half a minute for a drop of blood to go the whole round; say from the beginning of the aorta to the entrance of the vena cava into the right auricle.

Capillaries are the very minute vessels between the ends of the arteries and the beginnings of the veins. They are too small to be seen without a microscope. But in them the blood goes to and through all parts of the body (see **Anatomy**), and *irrigates*, so to speak, each part, by the oozing of **lymph** (the liquid part of the blood) through the capillary coats or walls. But **one** coat, however, and that a very thin one, belongs to the capillaries. The blood is pushed into these small vessels by the heart, aided by the arteries; and assisted somewhat by **capillary attraction.**

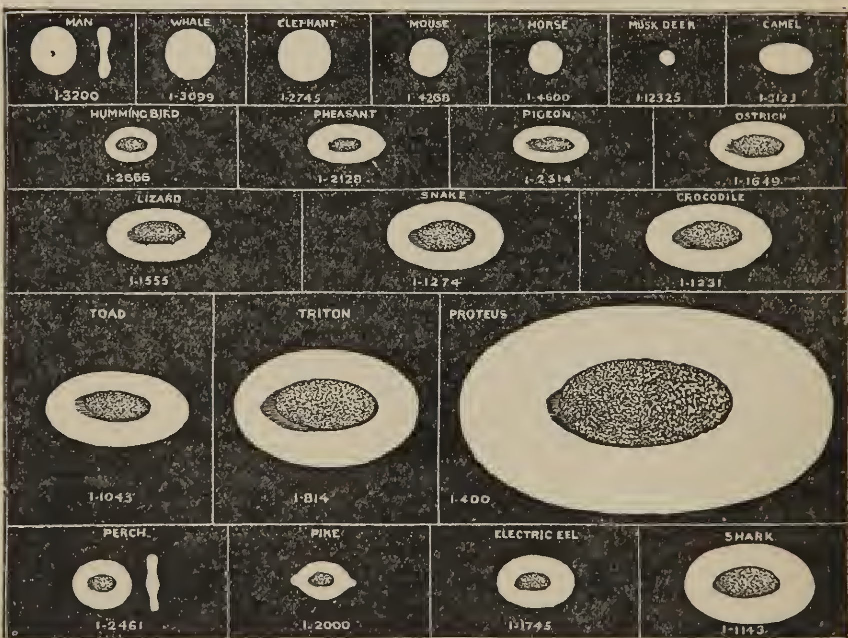
This kind of attraction may be studied outside of the body also. Put a lump of sugar into a saucer which contains only a teaspoonful of water. Presently you will observe that the water has *climbed* up to the top of the lump, and is melting (dissolving) it down. This happens because the sugar is *porous;* and each pore is a kind of small *tube,* in which the water is drawn upwards. So, too, in the little, delicate fibres of the roots of a plant or tree, capillary action takes place, forcing upwards the liquid from the ground.

THE BLOOD.

Many Caterpillars and Worms have blood which is a reddish, greenish, or brownish liquid. Man's blood, and that of all the higher animals, is a colorless liquid, in which *float* multitudes of minute bodies, **red corpuscles**, which give it a red color. Eight millions of these corpuscles would not more than cover the head of a pin!

With a microscope these are seen, shaped, in Man, something like railway car-wheels. Less easily observed, and much fewer (only one to several hundred of the red) are the somewhat larger **white** or

FIG. 43.



SIZE OF BLOOD-CORPUSCLES IN DIFFERENT ANIMALS (ALL MAGNIFIED).

colorless corpuscles. The white are rather more, and the red rather less, than one three-thousandth of an inch in diameter, in Man.

Wasting diseases lessen the number of the red blood-corpuscles, and reduce also the amount of **iron** in them, which is important for their and our health. Hence physicians often prescribe iron to be taken as a tonic medicine; it might really, in such cases, be called a **food**.

Blood has a saltish taste, and contains "salts," as chemists call substances more or less like common salt in their nature. When the blood *dies*, it *clots* or **coagulates**. That is, it separates into a watery liquid, called **serum**, and the *clot*, or **coagulum**.

About ten minutes after leaving the body the blood begins to clot; but, in a large quantity, it may be a good while, even hours, before the *serum* and *coagulum* are entirely separated.

Even within the body, a portion of blood which is parted from the current (as in that sort of swelling on an artery which is called an **an-**

Fig. 44.

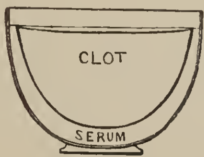
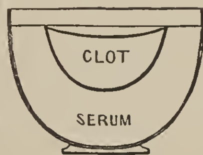


Fig. 45.

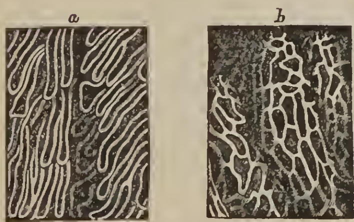


BLOOD COAGULA.

eurism) may "die," so as to coagulate. Now and then, when life is very low from exhausting disease, clots may form in the heart itself, and hasten death.

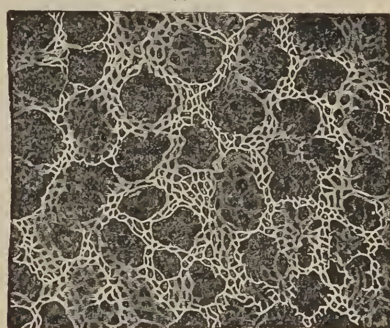
Uses of the blood are two: to **nourish** all parts of the body, and to **stimulate**, that is, wake up and spur on, the actions of the organs.

Fig. 46.



CAPILLARIES.
a, Of the skin of a Finger; *b*, of the Small Intestine.

Fig. 47.



AIR-CELLS AND CAPILLARIES OF A HUMAN LUNG (MAGNIFIED).

Nourishment is given (as already explained) by the liquid part of the blood (lymph) oozing through the capillaries everywhere into the tissues.

Stimulation of all the organs is ascribed to the *gas* (**oxygen** gas) in the blood, which needs to be renewed by breathing (*respiration*).

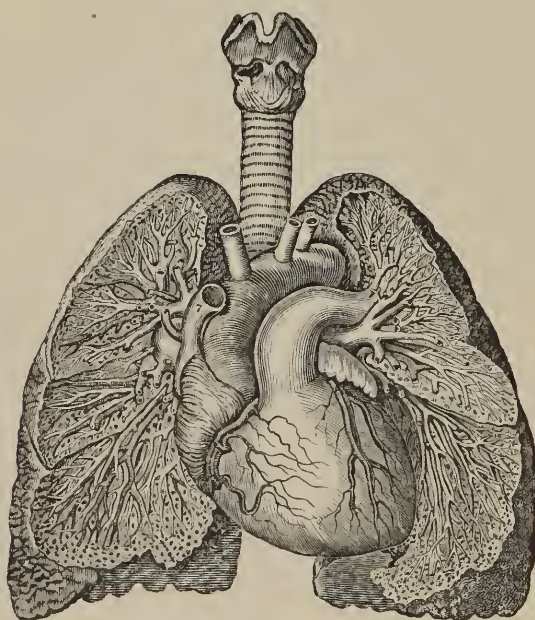
BREATHING.

Our lungs consist of about six hundred millions of air-cells, all surrounded by very fine capillary vessels, carrying blood. Thus the air, coming through the bronchial tubes to the lung-cells, acts on the blood through the thin walls of the cells and the delicate coats of the capillary vessels.

How is the air made to go into and out of the chest?

By the action of the **intercostal muscles** (see **Anatomy**), we lift our ribs, somewhat as we open an umbrella. Also, the **diaphragm**,

Fig. 48.



HUMAN WIND-PIPE, LUNGS, AND HEART.

the dome-shaped muscle arching across the middle of the body under the lungs and heart, contracts and goes down, becoming nearly flat. Thus, very much as with the two sides of a pair of bellows, we **expand** the chest, and draw the air in through the nostrils or mouth, or both. When *these* are closed, we cannot breathe at all.

Women lift their ribs most in breathing; children depress the diaphragm more, as shown by the bulging of the stomach (abdomen). Men breathe about equally in both ways. When one breaks a rib, a surgeon will bind the chest pretty tight with a broad bandage, so as to keep the ribs nearly at rest.

When the lungs are diseased, or the breathing muscles are weak, so much cannot be taken in as when we are well. It is a good sign of health to be able to draw a very long, deep breath. Life insurance examiners sometimes use this as a test of what is called *vital capacity*.

Fig. 49.

PLAN OF AIR-TUBES AND AIR-CELLS.

About sixteen times in a minute is the average **breathing rate** of a grown person, when quiet and in health. When ill, as with inflammation of the lungs, or even merely with fever, it may be hurried to forty or more times a minute. Children breathe more rapidly, taking much shorter breaths.

What we breathe for has already been partly explained. It is to get oxygen into the blood, and carbonic acid gas out of it. We also exhale **watery vapor** constantly; as may be seen in the little mist before one's nostrils out of doors in cold weather. Also, the frosting of window-panes shows the freezing of moisture, part at least of which is from the breaths of people in-doors. Moreover, the odor of the breath of most persons gives proof of the giving off of *waste matter* (dead and dying particles) from the blood by the lungs.

Carbon, to an amount equal to about half a pound of charcoal in twenty-four hours, is exhaled by every grown person, in the carbonic acid of the breath. Of watery vapor, each of us breathes out, in the same time, what would make, if condensed, nearly a pint of water.

Carbonic acid gas, when unmixed with air, cannot be breathed at all; it "chokes" at once. When mingled with a large quantity of air, we can breathe it easily enough; but if there is one-tenth or less of it in the air, it puts one to sleep; and this, if prolonged, is the sleep of death. Persons lying or sitting near a charcoal fire whose fumes are not carried off by a good chimney, are thus overcome in a short time. Common "coal gas," from a fire of anthracite or bituminous coal, is even more poisonous. No one should ever remain in a room where, from bad draught, a stove or other fire gives off gas enough to be known by the smell. Burning gas, used for lighting, is likewise very poisonous when breathed. Not a few persons have lost their lives, through ignorance, by blowing out the flame of a gas-burner, without turning it off, and then going to sleep where the gas is escaping.

The *Grotto del Cane*, in Southern Italy, is a cavern from the ground of which there is a natural supply of carbonic acid gas. That gas is

heavier than air, and lingers awhile near the earth. When a man goes into the cave with a dog, the animal, being nearest the ground, is soon overcome, and falls as if dead. If taken out at once it will revive again.

Nitrogen gas, which makes four-fifths of the air, appears to have no important part therein, except to dilute the oxygen.

ANIMAL HEAT.

On our commonly used Fahrenheit thermometers, "**blood heat**" is put at ninety-eight degrees (98°). But it should be marked higher. In the armpit of a healthy man or woman, a thermometer with its bulb remaining for five minutes will mark 98.5°. In the heart itself, it is 100°.

Our bodily heat does not increase much with hot weather, or in tropical climates, because the **perspiration** modifies it. Evaporation, of water or any other liquid, cools the surface where it happens. Thus an engineer can attend to his fires where the thermometer marks 110° or higher, so long as he sweats freely; not otherwise. Flannel is the best thing for clothing under such circumstances; because it absorbs perspiration well, and is also a *slow conductor of heat*—that is, heat does not go through it rapidly, as it does, most of all, through metals. All clothing is useful to us chiefly by its slow conduction of heat, either *from* or *to* the body. (More will be said of this under **Hygiene.**)

Chabert, who was called the Fire-king, by special training and preparation of his clothing, was able to enter safely a large oven or furnace heated to 600° Fahr., nearly three times as hot as boiling water.* Hot-air baths are often taken at 150°; some use them as high as 250°. Yet if the blood is **really heated** up to 110°, life is endangered. Many reptiles are killed by a temperature of 100° Fahr.

What causes the warmth of the body? This has been briefly explained already, when we referred to **carbon** being **consumed**, burned (along with hydrogen, etc.), in our bodies by **oxygen.** It is not in any one part of the system that this occurs, as in the house it does in a stove, grate, or furnace. It is going on in the blood everywhere, as it flows; but the heat is of course greatest near the centre of the body, in the heart and lungs, where there is the most blood; and is least in the parts farthest away from the centre, as the feet.

* Water boils at 212° Fahr., and freezes at 32°.

Children have rather more natural warmth than adult persons; but when exposed to severe cold, they suffer soonest and most. When only the feet are frozen, they may **mortify**, and the sufferer may survive. Arctic explorers have sometimes thus lost their toes. If any one is in danger of being frozen to death, from continued exposure to extreme cold, great drowsiness comes on, which ought not to be yielded to; sleep then brings death.

Fever is marked by increased heat of the body; the hotter it becomes, the more serious the case. In scarlet fever, for example, it may run up to 104°, 105°, or 106°, or higher.

EXCRETION: DISCHARGES.

"We all do fade as a leaf." All creatures that live on earth die, particle by particle—life and death are inseparable everywhere. As we have compared the heat-making process in our bodies to the slow burning of a fire, so our waste material may be compared to the gas, smoke, and ashes of the furnace. All such things must be removed, or the fire is smothered and extinguished.

Breathing serves both to supply the draught to our inward combustion and to **carry off** a portion of waste, such as carbonic acid, watery vapor, and minute dead particles of organic matter, from the blood.

Other organs help in this indispensable removal; most directly, the **kidneys** and bowels (**large intestine**); also, secondarily and partially, the **liver** and **skin.** Should any of these stop their work of purifying the blood, it must become poisoned by its own decay. If the stoppage of breathing did not kill at once by arresting the supply of oxygen, it would soon do so by accumulation of carbonic acid in the blood. When the skin ceases to transpire for a day, or the kidneys fail to secrete for a week, or the bowels for two or three weeks, death will usually follow.

Secretion is the process by which any fluid or solid material is separated from the blood. **Excretion** is the name given to it when such matter is entirely thrown off as waste. Milk is an example of a secretion *for a purpose of* **use** (to nourish offspring), not for waste. Tears also are useful, in moistening the eyes; and their abundant overflow at times gives relief to the brain under the excitement of strong feeling.

Altogether **excretory**, in man, is the action of the **large intestine** and that of the **kidneys. Perspiration**, upon the skin, has its **use** in maintaining the softness, and moderating the temperature, of the surface of the body. **Bile**, secreted by the liver, is partly excretory, but also serves a purpose in digestion.

THE LIVER.

This is the **largest** of the glands. It secretes **bile**; but that is not all that it does. It receives blood by an artery, coming from the aorta; but it also receives **venous** blood, through the **portal vein** (see, on a previous page, under *Physiology of the Circulation*).

Now this portal vein receives a good deal of blood from the **stomach** and **small intestine.** When these have received and digested food, the chyme and chyle there formed are absorbed (taken up) both by **capillary blood-vessels** and by **lacteal absorbents.** And while the **lacteal** vessels take their chyle, through the mesenteric glands, to the **thoracic duct,** which empties into the great veins at the left upper corner of the chest, the **capillary** vessels go to the **portal vein,** and thus supply **food-enriched** blood to the liver. The liver then acts upon it; **assimilates** it to the stuff of the body which it is to build up and repair; that is, to nourish. Going into the liver as *fluid food,* the blood leaves it more like *fluid tissue.* The spleen, as already said, probably does a work somewhat like this; but *exactly how* these organs act, it is very hard to make certain.

The greenish-yellow bile, when formed, goes generally from the liver into the gall-bladder under it. Then, an hour or two after a meal, it is forced from the gall-bladder into the duodenum, into which also is poured the secretion of the pancreas. Both of these liquids aid in finishing digestion. The bile, also, stimulates the muscular (**peristaltic**) action of the intestinal canal; in common words, *keeps the bowels open.* Costiveness is very apt to be accompanied by clay-colored discharges, having little or no bile in them. Very bilious ones are yellow, or yellowish-green. Their natural healthy color is a dark yellowish-brown. Black passages are not common, except when iron is taken as a medicine.

Right action of the liver is very important to a healthy condition of the body. Its disorders are most common in hot climates, and (in any climate) among those who drink alcoholic liquors. Jaundice is a yellowness of the skin from the coloring matter being thrown out on the surface of the body, instead of taking its usual course through the intestines. The "whites" of the eyes are then commonly tinged yellow also, and sometimes the tongue.

Most of the bile is **re-absorbed,** with digested food, from the small intestine into the blood; but not all of it. And it is necessary to health—it would seem essential even to life—for it to go from the liver or gall-bladder into the intestines. Experimenters have found that if, by a tube, they turn off the bile from the body of an animal altogether, it will die.

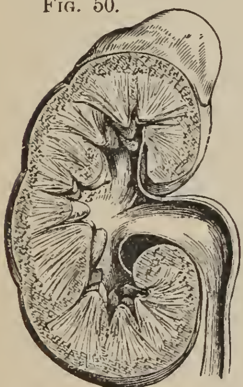
THE KIDNEYS.

These secrete the urine, from the blood; from **arterial** blood, in **Man.** In some other animals (reptiles and fishes) *portal venous* blood goes to the kidneys as well as to the liver, and there mingles with arterial blood.

Only the *rind* or outer coating (**cortex**) of the kidney secretes urine. There is in this part a remarkable arrangement of secreting **cells,** *tufts or knots of* **capillary blood-vessels,** and little **tubes** (all microscopically small) beginning in a sort of caps over these tufts or knots.

These tubes run into larger ones, which all join (see Fig. 50) to go to the **ureter,** the duct through which the urine runs to the **bladder.** There it waits until removed from the body by the *urethra* (see **Anatomy**).

Fig. 50.



SECTION OF A KIDNEY.

Fig. 51.

STRUCTURE OF KIDNEY, MUCH MAGNIFIED.

The urine is a true excretion; mere waste. Two or three pints of it are thrown out daily by a grown person in health; the most in cold weather. The kidneys and skin *take turns,* as it were, in their work. Both act all the time; but the more we perspire, the less is passed from the kidneys; and *vice versâ.* Check of perspiration, from cold, may find relief in increased urination. If not, then comes trouble; we "catch cold," as we say; really, the cold catches us. When both skin and kidneys have their secretion almost entirely stopped, or considerably

lessened, *dropsy* may follow, from the water (commonly going out as perspiration and urine) escaping from the blood-vessels, under the skin, or into the abdomen, chest, or elsewhere in the body.

Slight changes in the quantity, color, or clearness of the urine are not important. When a physician suspects that something is wrong, he examines the urine chemically and with the microscope. Sometimes there is a good deal of *sugar* in it, making the disease *diabetes*. More often, especially in somewhat broken-down people, there is *albumen* (very much like white of egg) in it. One sign of *Bright's disease* is this, *albuminuria*.

Some things taken as food or medicine pass out but little changed with this secretion. Thus may be observed the odor of asparagus, and the color of rhubarb, etc. In jaundice, especially if there is less color of bile than natural in the passages from the bowels, the urine is often of a dark bronze-yellow or porter color.

When *no* secretion from the kidneys occurs at all for days together (suppression of urine) **uræmia**, or blood-poisoning from materials of urine not removed, occurs; with a tendency to stupor and death. *Gravel* and *stone* in the bladder result from a change in the urine, owing to a fault of the kidneys, and generally of the blood still more; the water secreted not dissolving all the mineral matter sufficiently.

INTESTINAL EXCRETION.

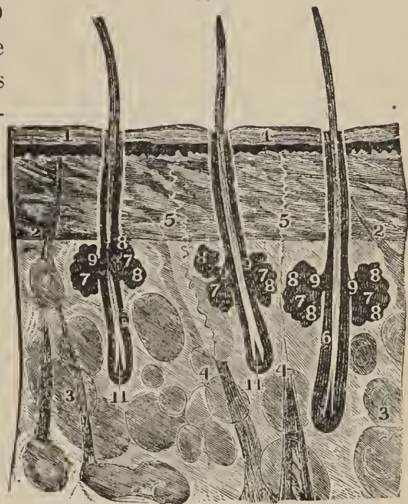
In Man, as already said, the large intestine takes no part in digesting food (as it does in grass-eating animals, such as the ox), but only **carries out** refuse and waste; excreting, as physicians say, the *feces*, or discharges from the bowels. Not only what is left over, either because indigestible or because too much has been eaten, goes thus out from the body. Along the large intestine there are small **glands**, made of minute cells, which have the duty of taking **from the blood** the most offensive and putrescible of all waste matters. These and the refuse of food, together, make up the excretion. Its necessity to health is well known to all. We shall refer to it again in connection with HYGIENE.

THE SKIN.

Two important uses, besides help in **excretion** and purification of the blood, belong to the skin: **protection** of the parts beneath it from injury, and **feeling** or sensation.

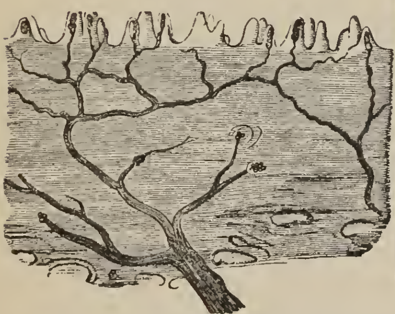
Two kinds of secreting glands are found in it; **sweat-glands** and *oil* (**sebaceous**) glands. The first of these are very numerous—2700 to a square inch on the palm of the hand. The oil or sebaceous glands are most numerous upon parts covered with hair.

Fig. 53.



HAIRS AND SEBACEOUS GLANDS (MAGNIFIED).

Fig. 52.



SECTION OF THE SKIN (MAGNIFIED).

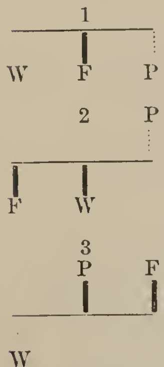
The sweat-glands send up spiral tubes, which open slantwise on the surface of the skin, where, though they are too small to be seen without a microscope, we know of their existence when the perspiration collects in drops. The oil-glands are planted, so to speak, in the tissue under the skin near the hairs; as shown in Fig. 53. By slow transpiration and seen or felt perspiration together, we give off between one and two pints of water from the skin daily; most in summer.

OUR MOVING POWERS.

Muscles move the bones like any other kinds of levers. There are three sorts of levers. First, that in which the **fulcrum**, or place of rest, is between the **power** that moves and the **weight** to be moved.

In the second, the *weight* is between the *fulcrum* and the *power*. In the third, the *power* is between the *fulcrum* and the *weight*.

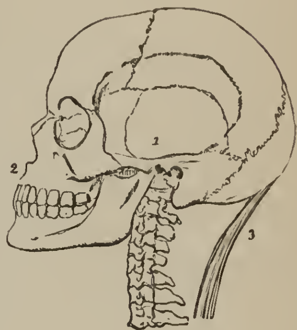
Fig. 54.



THE THREE KINDS OF LEVERS.

Working a pump-handle is an example of the *first* kind of lever. So is throwing one's head back or forward; the fulcrum then being at the junction of the head with the upper end of the spinal column.

Fig. 55.



1. Place of the *Fulcrum*. 2. End of the *Weight*. 3. The Muscle, which is the *Power*, when the Head is moved backwards on the Spine.

Of the *second* kind of lever, wheeling a wheelbarrow gives an example. In the body, we have it in raising one's self on the toes. Then the *fulcrum* is at the toes, the *weight* is the whole body, and the *power* is that of the muscles of the calf of the leg, applied by the *tendo Achillis* (see Anatomy) at the heel.

The *third* sort of lever is used when we pull a ladder out from a wall by one of its lower rungs, while keeping the end on the ground with the foot. In our bodies it is exemplified by the muscle with which we bend the arm at the elbow (*biceps* muscle).

Fig. 56.

THE BICEPS MUSCLE.

Here the *fulcrum* is at the elbow; the *power* acts where the *tendon* of the muscle is attached to the radius; and the *weight* is that of the forearm and hand. In this arrangement, there is not more than one-

tenth as much lifting power as there would be if the tendon were inserted at the wrist. But what would be thus gained in strength would be lost in speed; and such a formation would make a limb nearly or quite as thick as an elephant's; out of all proportion, and excessively awkward. We are made more wisely than that.

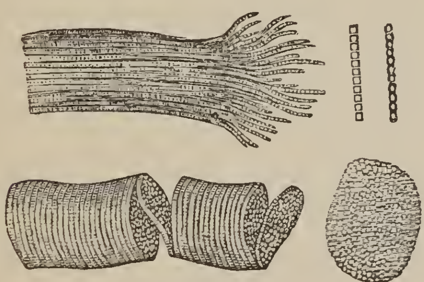
Opposition of muscles is seen all over the body. **Flexors** bend the arm at the elbow, the hand at the wrist, and the fingers on the hand; **extensors** put them back again. **Inhalation** (breathing *in*) is effected by the intercostal muscles lifting the ribs, and the diaphragm flattening down under the lungs; **expiration** (breathing *out*) is made forcible (blowing) by the flat muscles outside of the abdomen pressing upwards. **Adductors** bring the fingers, or the legs, near together; **abductors** separate them from each other; and so on.

There are many muscular parts of our bodies which are not under control of our will. Early in this book, something was said of the **fibres** of **red, striped,** or **striated** muscular tissue. We can get at these fibres by splitting up a piece of an animal's red flesh lengthwise, with a fine knife, and then examining a very small shred of it with a microscope.

Fig. 58.

SMOOTH MUSCLE.

Fig. 57.



STRIPED MUSCLE.

The other kind of muscular tissue is not made of fibres, but rather of flattish **bands**, each of which is composed of long, spindle-shaped cells, as seen under the microscope. This is the **smooth, pale,** or white muscle, found in the walls of the arteries, in the muscular coat of the stomach and bowels, and in some other internal parts. This sort of muscle is *never* under control of the will. It is not so quick in its action as the red kind.

We may divide all our muscles into **voluntary, involuntary,** and **mixed** muscles.

The **voluntary** are all those of the arms, legs, jaws, neck, and trunk,

which every one can do with as he will. **Involuntary** are chiefly those of the stomach, bowels, blood-vessels, iris around the pupil in the eye, and the *heart*. The heart is remarkable in being formed of *red*, *striped* muscle, and yet being *not*, like them, under the command of the will. *Emotion* acts upon it; as when it beats strongly from excited feeling, drags weakly from sorrow, or comes almost to a sudden stop from fear. So, in many languages, "the heart" is said to be the seat of all our feelings. In fact, this is not true. The heart is *affected* by our feelings, but their real seat is *the brain;* of which more after awhile.

Mixed muscles are those over which we have some power, but which also act without, and sometimes against, our will. Such are those of the lower part of the *pharynx*, or swallowing-tube of the throat. Get something *half-way down*, and (unless it is too large or sharp and sticks fast) it will go the rest of the way, whether you wish it to do so or not. Our *breathing* muscles are by no means altogether under the power of our wills. We may hold our breath for some seconds; it is difficult to do it for a whole minute; *nobody* can do it for two minutes at a time. Suicide was never committed by a person holding his breath until he died. It would never do for a man to be able to manage his breathing at his will. How, if one could, would we get on when sleeping? Some nervous people would be afraid to go to sleep at all, for fear it would stop altogether for want of attention.

Another set of mixed muscles are those of the face and of the vocal windpipe (larynx), by which we naturally express our emotions. Most people show in their faces whether they are happy or unhappy, pleased or angry, courageous or frightened. Also, by the tones of our voices we express joy, sorrow, anger, pity, or fear. All this is done by **muscles**; those of the eyebrows, cheeks, lips, and organ of voice (larynx). We *can* frown or smile, or speak softly or harshly, at will; but the *natural* way is, for our **feelings to express themselves** involuntarily. An actor who wants to represent a character does it best by *throwing himself into* the person whose part he is taking, so as to suppose himself to be that character. An orator who wishes to arouse feeling in those to whom he speaks, must first feel strongly himself; and then he will express it so as to affect them also. Artificial, studied tones and gestures, are much less effective than those which are the **natural language** of emotion.

Every muscle, whether voluntary or involuntary, acts by drawing its ends or sides towards each other. This is called the **contraction** of the muscle; its shortening. But, while it shortens, or becomes smaller in one direction, it **thickens**, growing larger in another direction: its whole bulk remains the same.

A slight contraction belongs to every muscle during life. The stronger muscles get, of course, some advantage when no effort is being made. So our fingers are bent more or less when we are asleep, because of the flexors being stronger than the extensors.

After death, the muscles stiffen. This is the **rigor mortis**, as it is called. It does not happen at once, but in a variable time; beginning, at the earliest, ten or fifteen minutes after breath ceases; more commonly an hour or two later; sometimes not until six or seven hours have passed. All the muscles then become firmly set. Gradually this passes off; and then decay of the body begins and (unless prevented by cold or an embalming process) goes on rapidly. A body should be prepared, by an undertaker or some other proper person, for "laying out" *before* the stiffening comes on; as the position of the limbs cannot be adjusted rightly during the time of the rigor mortis.

All the muscles, inside and outside of the body, heart, arteries, stomach, intestines, and the rest, undergo this *rigor*. Indeed, it begins in the left ventricle, and the last part to contract is the right auricle of the heart.

When one dies after a long and exhausting illness, the rigor mortis comes *soon* and lasts but for a short time. A person struck down in the midst of vigorous health, will have the same change delayed for several hours, and then passing but slowly away.

Before the rigor mortis begins, *electricity* can be made to cause *movement* of the muscles. A fearful appearance is thus presented, when a dead man's face has its eyelids, brows, or lips to move. Occasionally, without any such cause, especially in those dying of epidemic (Asiatic) cholera, an arm or a foot has been seen to move after death, of itself!

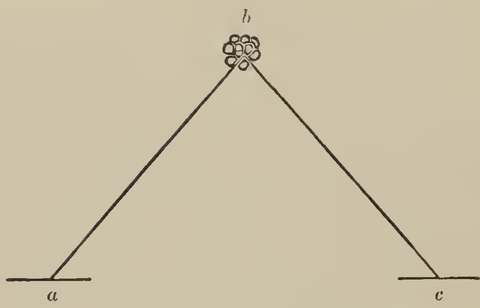
HOW WE FEEL AND KNOW.

Brain and **nerves**, every one is aware, we all have. **Brain, spinal cord, ganglia,** and **nerves** make the full list of the apparatus of the highest animals, for feeling, knowing, thinking, and willing.

Plants have no brains, ganglia, nor nerves. They do not feel, think, or will. In the simplest animals, there is no need of any; just as a border-ranger, living in a hut, has no use for a front-door bell or a speaking-tube. Nerves are made to **take messages.** A nervous system is a telegraph system; **ganglia** are, so to speak, the **offices** at which messages are taken and sent out. All animals that have nerves have ganglia.

Why should a fly need a nervous system, when an amœba (single-cell animal) does not? Because the amœba feels, so much feeling as it has,

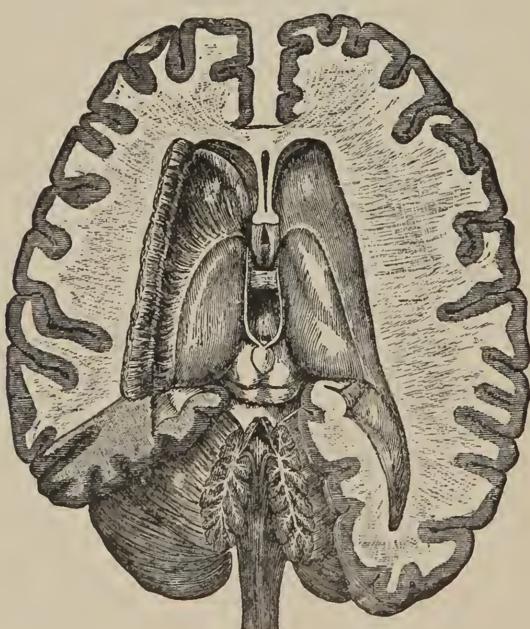
Fig. 59.



SIMPLE REFLEX ACTION.
a, Seat of Touch. *b*, Ganglion. *c*, Place of Motion.

all over at once. A fly does not. Suppose that, flitting about, it touches a foot to something burning hot. The message of pain goes through a nerve from its foot to its central nervous cord (where there are ganglia,

Fig. 60.

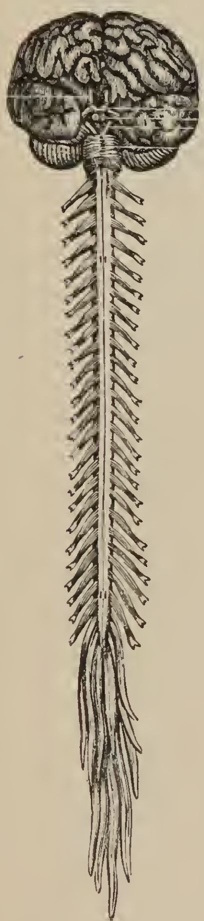


LOWER PART OF HUMAN BRAIN; ALL THE UPPER PORTION CUT AWAY.

though not brains like ours), and from that centre a message goes to the wings, making them carry the fly away in safety.

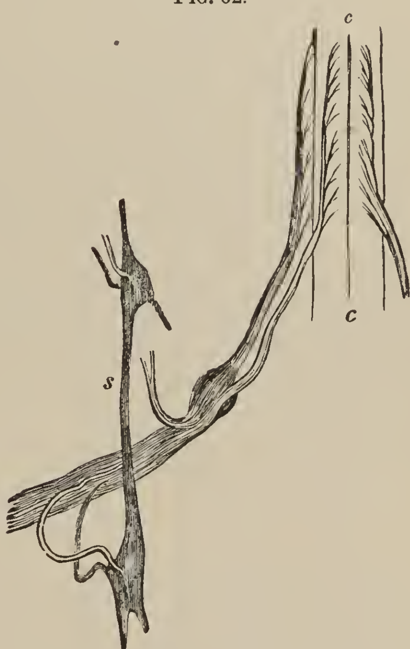
The simplest movement under nervous communication is called a **reflex** action. It needs **two nerves** and a **nerve-centre** or ganglion. One nerve takes an impression (from *a* to *b*, Fig. 59) from a sensitive part to a nerve-centre. The other (from *b* to *c*, same Fig.) carries it from the ganglion to the muscle which is thus excited to motion. This is something like the **reflection** of a ray of light from a mirror; whence the term reflex action. It is of the same nature whether the sensitive part which gets the impression is at the outside surface of the body, or

FIG. 61.



BRAIN AND SPINAL CORD.

FIG. 62.



CONNECTION OF A GANGLION WITH THE SPINAL MARROW.

c, Spinal Marrow. *s*, Nerve going to a Ganglion.

anywhere within it; also whether it goes to a simple ganglion apart from brain or spinal cord (see **Anatomy**), to the spinal cord, or to the brain. Or, again, whether from the ganglionic centre, whatever it may be, the impression is reflected to a **muscle**, causing **motion**, or to a **gland**, producing **secretion**; for instance, of tears.

In those animals which, like the insect, have only ganglia, without **true** brains, reflex actions occur **automatically**. What is an autom-

aton? A clock, a watch, or a steam-engine is one. It is a machine that *goes of itself*, after you wind it up; or, if wound up or fixed up, then a touch, or a shovelful of coal now and then in the right place (as with the steam-engine), will *keep it going*. A man is not an automaton, because he has a will of his own; but many subordinate actions in our bodies are automatic.

In Fig. 60, the **white substance** of the cerebral hemispheres is shown on each side, bordered by the **convolutions** (wrinkle-marks), which are mostly of **gray nerve-substance.** The hollow spaces are **ventricles** (cavities) of the inner brain. At the lower part of the Figure, we see the **cerebellum.**

Below the brain, the **medulla oblongata,** which begins within the skull, goes down into the **spinal marrow.** Out of and into the spinal marrow and brain many **nerves** pass; **afferent** nerves taking impressions *to* nerve-centres, and **efferent** nerves taking impressions *outward from* nerve-centres to muscles or other parts. (Afferent, from *ad*, to, and *fero*, to bear; efferent, *e*, from, and *fero*, to bear.)

Moreover, nerves connect the spinal marrow, all the way down, with a number of **ganglia** (once called **sympathetic**); a double row of them being outside of the back-bone, a large pair behind the stomach, and others near the different internal organs.

NERVES.

As shown above, the simplest possible nervous system consists of a ganglion and two nerves. One of the latter (afferent nerve) carries impressions from a part of the animal's body *to* the ganglionic centre; the other (efferent nerve) takes impressions out *from* that centre to some portion of the body.

We find certain **general facts,** which may be called *laws*, to be proved about nerves. 1. Each nerve-**filament** (of which there may be **many** in each **nerve,** which is a *bundle* of filaments) conveys impressions only **in one direction.** No filament is both *afferent* and *efferent*. This is different from telegraphic wires, which take messages either way; from Boston to Philadelphia, or from Philadelphia to Boston, for example, at the will of the operators. But, in our nerves, each **bundle** may have filaments, *some* of which are afferent (in-carrying) and others (out-carrying) efferent. And these filaments are so fine and so closely laid together as to seem in a nerve like one solid mass. By aid of the microscope, however, not only is each nerve shown to

consist of a large number of them, but each filament is found to be a **tube,** whose contents during life are almost or quite *fluid;* certainly very soft.

2. Each nerve of **sensation** (touch, sight, hearing, smell, taste) conveys only **one kind** of impression. This impression depends upon what centres and organs it connects. No one can hear with his eyes, smell with his ears, or see with the ends of his fingers. Should any one say that he can do so, do not believe it; whether it be called *mesmerism* or otherwise. Miracles are possible, under the power of the Creator of the world; but *they* show their Divine authority. Miracles apart, it is a question of science; and science ascertains the true usual order of nature; whatever seems to violate that, must be either a trick or somebody's mistake. In public exhibitions, it is most likely to be the former; in private circles, it *may* be the latter. Either way, it is the part of good sense to maintain a strong confidence in the order of nature, as made known by the *careful* and *many times tested* inquiries of **science.**

So general is this fact of the **specialty** of sense-nerves, that even common touch is not conveyed by the nerves of sight, hearing, taste, or smell. When an eye has been removed by a surgical operation, touching the end of the optic nerve causes not pain, but a *flash of light.* So also a blow on the eye makes one "see stars." Such a blow causes pain also; but this is because **nerves of touch** go to the eye, as well as the **nerve of sight** (optic nerve). We cannot bring this fact to the direct test with the other special nerves, but there is every reason to believe that it is true of them all.

How, then, it may be asked, do blind people get about? By using the information given by such senses as they have. You see the blind man *feeling* his way with his stick (or his hands, in a room), and *listening* intently for all sounds around him. He learns to feel and hear more acutely than others who have their eyesight. Blind persons can learn to *read* with their fingers, in books with *raised letters,* made on purpose for them. Laura Bridgman, the famous patient of Dr. Howe, who was *blind* and *deaf* from infancy, was, by great skill and patience, taught to know and do a great many things, by *touch alone.*

3. Sense-nerves commonly **report** their messages as coming **from their ends.** Experience may correct this; but such is the general fact. When the nerve (often called "crazy bone") at the inner side of the elbow-joint is struck by accident, a tingling follows in the *little finger* and the finger next to it; not in any other fingers. This is because that (ulnar) nerve which was struck goes down the forearm and gives its

branches to those two fingers; and it reports the effect as if it was *in the fingers themselves.*

So, when a leg has been cut off while the patient was made unconscious by breathing ether, he may for some days feel pain or itching, as he will say, "in his toes," when there are no toes there. The impression really is in the stump, where the nerve was cut off.

Pain from disease is, likewise, not always felt in the seat of the disease. Hip-joint affection (*coxalgia*) is attended usually by pain, not in the hip, but in the knee; and there are other instances of the same kind, in different maladies. When a tooth is partly decayed and inflamed, the impression of pain may become so strong in the *nerve-centre* to which its nerve goes, that the *whole side of the face* may seem to ache with the offending tooth.

THE GANGLIA.

Scattered in different parts of our bodies, these nerve-centres always have two sorts of connections: one (by nerves) **with the spinal marrow,** and the other with **various organs.** Those organs are always the ones concerned either in **digestion, assimilation, circulation, secretion,** or **reproduction.** Of these functions, a good deal has been said already, on previous pages. While, then, the **power** used by these ganglia may come from the spinal marrow, it is almost certain that they mainly **regulate** the actions of the heart, arteries, stomach, bowels, liver, spleen, kidneys, ovaries, uterus, and lymphatic glands. To these actions or functions the name is applied, "the functions of **organic** (as distinguished from the more truly *animal*) life." They serve to keep up the conditions necessary for the action of the *organs,* and thus of the **organism,** *i. e.,* the whole living body. **Animal** functions are those which animals have and vegetables have not; as **sensation, motion,** and **thought.**

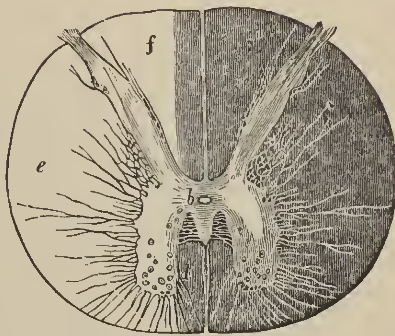
All the ganglia now spoken of together make, with their connections, the **Ganglionic System of Organic Life.**

SPINAL MARROW.

Up and down the whole length of the back, in a channel for it in the spinal column, lies the soft nervous mass called the **spinal cord** or **marrow.** (The marrow of *bones* is a *fatty* material, *not* of nerve-substance.)

Gray matter, formed of nerve-**cells**, is in the **interior** of the cord, and spreads out in four horns (Fig. 63); two in front (lower part of the Figure) and two longer ones behind.

Fig. 63.



SECTION OF SPINAL MARROW.

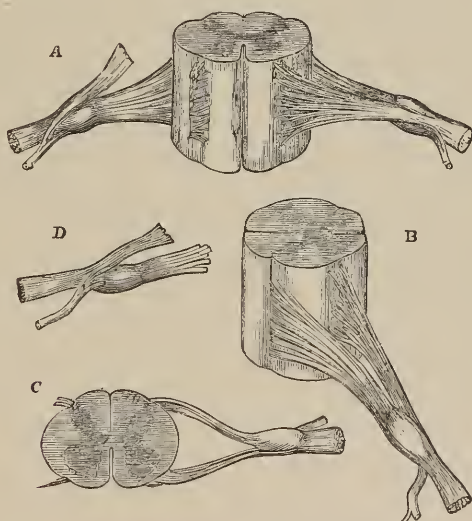
b, One Horn of Gray Substance. *e, f*, Parts of White Substance.

Out from the spinal cord, through all its length, go and come **nerves**, in pairs, one on each side, through holes (foramina) arranged for them. There are **thirty-one** pairs of spinal nerves.

Each of these nerves has **two roots**; an **anterior** (front) and **posterior** (back) root.

On each **posterior** root there is a **ganglion**; none on any anterior root. Experiment proves that **feeling** goes up to the cord through the **posterior** roots; **motion** is impelled by messages sent down through the **anterior** roots only. Cut the anterior root of a spinal nerve, and

Fig. 64.



SECTIONS OF SPINAL CORD, SHOWING ROOTS OF NERVES.

A, Front view. B, Right side. C, Upper side. D, Roots alone.

the animal will *feel* as usual; but it *cannot move* the part to which that nerve sends its branches. If you cut the posterior root, it will no longer

feel anything done to the part which that nerve supplies; but motion can be effected through the anterior root.

Impressions must go to the **brain** in order for us to feel them. Therefore the spinal marrow must **carry them** *up to the brain.* That, and bringing down from the brain commands for **movements,** are two of the uses of the spinal marrow. Under **Anatomy,** it has been shown that **several nerves** (of *sight, taste, smell, hearing,* and of *touch for the head and face*) are **directly** connected with the **brain.** No nerve of any special sense except **touch** ends in the spinal cord; but all the 31 pairs of spinal nerves are nerves of **touch** as well as of **motion**; that is, they contain **filaments** of both kinds.

But the spinal marrow has some business of its own, besides being subordinate to the brain. When a frog's head has been taken off, if one of its feet be touched, that limb will be jerked away. How is that, when, as the brain has been removed, it is supposed not to feel anything? Some physiologists think that the spinal cord may feel as well as the brain. But this conclusion is not here necessary; we can explain the foot-movement otherwise. It is a **reflex action.** A few pages since, we gave some account of such actions. In their simplest form these do not need a brain; any **ganglion** will do. So there are reflex actions whose centres are the ganglia of organic life, referred to above, not long since. Others have their centres in the gray substance of the spinal cord; still others, in the **medulla oblongata,** which connects the spinal marrow with the brain, within the skull. These last are the most important of all; **breathing** and **swallowing.** When an animal is *pithed* by passing a knife through the uppermost part of the back of the neck, dividing the spinal cord just below the medulla oblongata, it will die at once if it be one of the higher vertebrates (man, mammals, birds); and after no great length of time if of a lower class (reptiles, fishes).

Breathing is a beautiful example of a reflex action. Want of air is *felt* by us only when rather extreme; but before that, an **impression,** *not* felt, of that want, goes from the blood in the lungs up to the **medulla oblongata.** Thence is **reflected** downward through **motor** nerves the message of command to the **breathing muscles,** namely, intercostal muscles and diaphragm (see **Respiration**). They at once respond, lifting the ribs and flattening down the diaphragm, sucking air in through mouth or nostrils and windpipe; which air goes to the lungs and freshens up (arterializes) the blood. This goes on regularly, 16 or 18 times a minute, day and night, *of itself,* **automatically**; without our attention. If the brain proper (cerebral hemispheres) be stupefied by opium, or by pressure of a clot of blood, breathing will still go on, so long as the **medulla oblongata** is all right. Thus, when surgeons

give ether or chloroform by inhalation for surgical operations, or a dentist uses nitrous oxide when he extracts teeth, the brain may be so lulled that the patient feels no pain; but the greatest caution is needful lest the *anæsthetic* (as chloroform, ether, and nitrous oxide, so used, are called) should extend its action down to the medulla oblongata. If it does so, death may result.

Swallowing is, in part, another reflex action. When the morsel has been pushed down into the **pharynx,** its muscles contract by reason of the impression being conveyed to the medulla oblongata, and reflected thence, as a motor impulse or message of commandment. (This last expression is, of course, only a figure of speech.)

Light shining upon the eyes causes their pupils to grow small by a similar reflex action upon the **iris** (muscle surrounding the pupil). If the retina has lost its sensibility to light, or if a cataract (opacity of the lens of the eye) prevents the rays from reaching the retina, the pupil will not contract under light. There are many other examples of reflex action in the body.

Under disease, we see **morbid** and excessive reflex actions. A child of nervous temperament has some difficulty in teething. Worriment of the **gums** is "telegraphed" through nerves to the **brain,** and, by sympathy, the **spinal cord** also is disturbed. Then may follow a violent reflex action of **muscles,** known as a fit, or **convulsion.**

Or, again, worms, or unremoved remainders of food, in the **bowels,** may irritate the spinal marrow by impressions carried through nerves, and convulsions may result. The spinal marrow is much **more irritable in infants** than in older persons. Convulsions are more often met with, and are less alarming (though always dangerous), at about **teething time** than later in life.

Another form of reflex disturbance is quite common at the same period of life. Teething may, if not going on just right, irritate, reflexly, the **secreting glands** of the bowels, instead of, or in addition to, the muscles of the body. Then we have **diarrhœa.** A moderate amount of this relieves the irritation. It should not be too much suppressed. Only when it is so great as to weaken the little patient, should medicine be given to keep it in check. When the gums are swollen, or tense and tender, over a tooth not yet through, a neat, clean cut down to the new tooth with a sharp lancet may give relief, and may prevent or put away either the **motor** or the **secretory** (excito-motor or excito-secretory) reflex actions.

Hysterical people, those who have *lockjaw* (**tetanus**), and those who suffer with **hydrophobia** (from the bite of a mad dog), all illustrate morbid reflex actions, in ways which it would take too long to explain in this place.

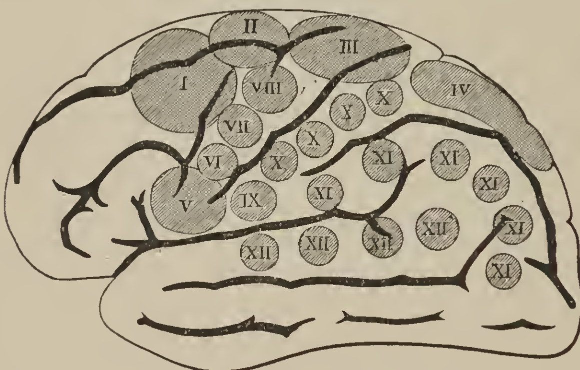
THE BRAIN.

When the skull has been partly removed, and the **brain** is seen uncovered, it looks like a wrinkled, gray mass of putty; in two equal parts, right and left, with a split (fissure) part way down between them. Wonderful, indeed, that *such* a material should ever have had to do with knowledge, love, fear, hope, right, wrong, conscience! Yet it was once so during life—the dome of thought, the palace of the soul.

Already, we have spoken of the main **parts** of the brain. More particularly, we may now say that, in the human brain, they are as follows: 1. The **hemispheres** of the **cerebrum.** 2. Under it, some parts, of gray and white nerve-matter, conveniently called the **mid-brain** (thalami, corpora striata, tubercula quadrigemina, etc., of anatomists). 3. The **cerebellum.** 4. The **medulla oblongata.**

Many well known facts show that the outer round and convoluted

FIG. 65.



SIDE-VIEW OF BRAIN, SHOWING FERRIER'S PSYCHOMOTOR CENTRES.

surface of the **hemispheres of the cerebrum** has the most to do with **mind**; that is, knowing, feeling, and will. Gall and Spurzheim, founders of the system of phrenology, thought that they could map out the brain-surface (even by examining it outside of the skull) into a certain number of *organs*, each connected with one of the *faculties* of the mind. Their system has been refused acceptance by physiologists, for want of satisfactory evidence.

Something like it, in so far as it is an effort to show that certain powers of the mind belong to particular parts of the brain, has been going on amongst physiologists ever since Gall's time; that is, during the last fifty years.

By laying bare the brains of different kinds of animals, as monkeys, dogs, cats, and rabbits, experiments have been tried, especially with elec-

tricity; and the actions of the animals, when certain parts are touched and excited, have been noted.

For our present purpose, it will be enough just to mention these observations, referring the reader to larger works on physiology for their discussion. The subject is still comparatively a new one, and scientific men have not yet reached a final conclusion about it. One point only may be further noticed here. Of all these "locations" of functions in the cerebrum, the strongest case has been made out for that of the faculty of language.

In the **third frontal** convolution it is believed that the power of **using words** to express our thoughts and emotions resides, and almost, or quite, exclusively in the **left** hemisphere of the brain.

Aphasia is a singular and not common disorder, in which the patient **cannot talk**; not because of any ailment in his "vocal organs" (larynx), but from **brain-trouble**; or, if he speaks, he gets the wrong words, and talks nonsense. Along with this affection, quite often (though not always) there is **palsy** of the **right** arm and right leg (right **hemiplegia**). Now it has long been known that, because of the **crossing** of nervous fibres at the uppermost part of the spinal cord, the **right** arm and leg communicate with the **left** half of the brain; and *vice versâ*. So, when patients having *aphasia* and *hemiplegia of the right side* together have died, and their brains have been examined, there has often (not always) been found disease at or near the *third frontal convolution* on the *left* side of the brain.

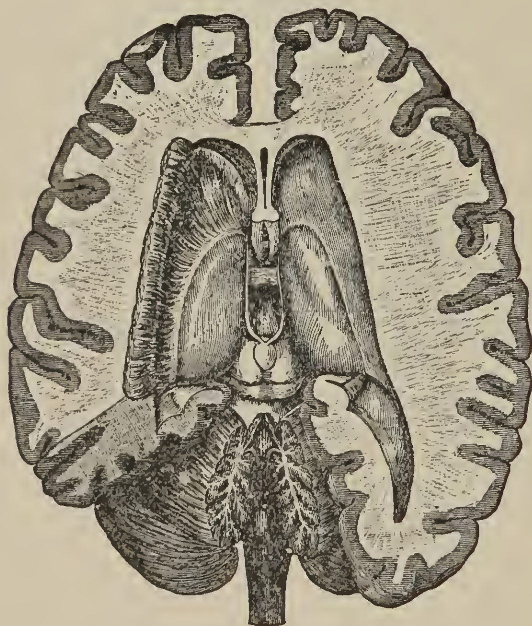
But, after all, this subject is surrounded with difficulties. Although, by electricity acting on the convolutions of the cerebral hemispheres, motions, that is, muscular actions, are excited, this cannot do away with the abundant evidence which has proved that the **chief** use of the **cerebrum** is to act as the **instrument of mind**; of knowing, thinking, feeling (emotions), and willing.

As a general thing, a large brain goes with large mental ability. There are, it is true, some very positive exceptions. The average **weight** of men's brains is about 3 pounds, say 50 ounces; those of women, 44 to 45 ounces. Very few brains have been known to weigh over 60 ounces. As women are mostly considerably lighter in their whole body weight, their **proportionate** weight of brain is scarcely less than that of men. Proportion, in this matter, is very important. Comparing other animals, the proportion of brain to the whole body for the class of Mammals (to which man belongs) is 1 to 186; in Birds, 1 to 212; Reptiles, 1 to 1321; Fishes, 1 to 5668. In Man, it is about 1 to 40. Only two creatures present a larger relative proportion; a little bird, called the blue-headed tit, and the field-mouse. With

these, it is not that their brains are large, but that their bodies are very small. Also, in them, the **cerebrum**, thinking brain, is not so large in proportion to the rest as it is in man.

The average *size of the head*, found by trying how much the skull, emptied of its brain-contents, will hold, is, with different races of men, from 80 to 90 cubic inches. The largest of 900 skulls measured by a distinguished German anatomist, R. Wagner, was that of a woman—115 cubic inches. Famous large heads were those of Oliver Cromwell; George Cuvier, the French naturalist; Volta, the Italian natural philosopher; and Daniel Webster. The largest skull ever measured, however, is said to have been that of a not at all famous German baker, of Louisville, Kentucky—125 cubic inches! Likewise, the heaviest brain on record was that of an English bricklayer, who could neither read nor write. He was "not very sober, had a good memory, and was fond of politics." Perhaps, if he had been sober, and had kept out of politics, he might have been a great man. Turgénieff, the Russian novelist, had a very heavy brain; Gambetta, the French statesman, one not above the average. Raphael, Charles Lamb, Lord Byron, and Charles Dickens had heads rather smaller than usual.

FIG. 66.



INTERIOR OF THE BRAIN.

The brain receives, in Man, a very large supply of blood; about one-

fifth or one-sixth of all there is in the body. The supply of *arterial* blood **varies in amount**, according to our activity of mind, in thought or emotion. When **asleep**, the **least** rapid flow occurs through the blood-vessels of the brain. This has been observed in the heads of young infants, whose "soft spots" (anterior fontanelles) are large. On waking, the brain swells out the fontanelle somewhat; and still more, when the babe is excited and cries. To prevent a sudden increase of blood in the head from doing harm by too great pressure, a watery fluid moves in and out (under the *arachnoid* membrane, which covers brain and spinal marrow), according to the pressure in the head. Also, the arteries (carotid and vertebral) which take blood to the brain are twisted spirally (cork-screw fashion), by which the change of pressure is made more gradual.

In sleep, the brain **rests**; best, when sleep continues for a number of hours unbroken, and without dreams. Only the brain, of all the organs of the body, needs and can get this **long continued** repose. The medulla oblongata, spinal marrow, and ganglia keep up some of the actions connected with them (breathing, circulation of the blood, secretion) day and night. The heart beats, and the lungs breathe, all the time. Each of these organs, however, has its share of rest, in the **short pauses** between the heart-beats, and between breaths; and in these bits of repose their nervous centres share.

SENSORY GANGLIA.

If the reader will look closely at Fig. 66, he will see, at *b*, a rounded mass shown at the base of the brain, somewhat forward; and, just behind it, another, on which are the letters *c* and *d*. Of these, *b* is called **corpus striatum** (striped body), and *d* the **thalamus** (chamber). (Plural, including right and left sides together, *corpora striata* and *thalami*.)

Now the **corpora striata**, which are in front, appear to have to do with the giving out of **motor impulses**. The **thalami** are probably the receivers of impressions of **sensation** from all parts of the body. At *h* and *i*, in the same Figure, are two smaller bodies on each side; all four being together the **tubercula quadrigemina** of anatomists. To these, as well as to the **thalami**, go the **optic nerves**, which take from the eyes all impressions of sight. Not far from the same region of the brain, come the ends of the **auditory** nerves (of hearing), **olfactory** (of smell) and **gustatory** (of taste) nerves.

Thus all sorts of sensations centre in this region of the brain, which may be called the **Sensorium.** The impressions of sense are sent up (*reported*, so to speak) from the sensorium to the convolutions on the outside of the **hemispheres.** There they are used as the "raw material" of **ideas** and to arouse **emotions.** The **will** deals with sensations, ideas, and emotions, by its power of **attention, choice,** and **direction.** The will seems to act "everywhere," as *boss* or general superintendent, in the brain.

But it is remarkable that the **sensory** and **motor** ganglionic centres (the corpora striata being the latter) are placed very **near** to each other.

Fig. 67.

BASE OF THE BRAIN.

23. Olfactory Nerve. 28. Optic Nerve. 35. Auditory Nerve. 32 and 36, *in part*, Gustatory Nerves.

Why is this? Our common way of doing things shows the reason for it.

When I begin to write this page, what do I do? I *look* at the paper, and then, **guided by my sight,** trace out the letters and words over the page. When you walk out of doors, do you keep your eyes shut? No. Try it (in a safe place) a little while, and observe the difference.

Blind persons can learn to sing or play well on an instrument, **by ear.** A "good ear" is necessary to every musician, as well as a good voice and a skilful touch. *Those who are born deaf are mute*, simply be-

cause, hearing no sounds, they cannot learn to speak. If they become deaf during childhood, they are apt to keep a childish tone of voice through life.

So, also, a painter or sculptor must have an eye for the beautiful, in color, form, and proportion of objects. All our **actions** are **guided** by perception of **sensations.** There is, or may be, in this, something **automatic.** What we are used to doing a great deal, comes to be so easy that we pay little or no attention to it. Walking on a smooth street or road is an example. Some persons are said to be so proficient in piano music that they may fall asleep over an instrument in the middle of a piece, and yet go on and finish it. Soldiers, very much fatigued, have been known to go "marching on," with regular steps, asleep! *Somnambulists* (sleep-walkers) go about with their eyes open. Their *seeing brain* and *moving brain* (sensorial ganglia) are awake, while their *thinking brains* (or a considerable part of them) are asleep; as is shown by their remembering nothing of what they did the next morning. This observation shows that, although not believing in phrenology, we must admit that **different parts** *of the brain have* **different functions** *and* **powers.** One part may be quiet, even sound asleep, while other parts are awake and active.

What makes it difficult and dangerous, to most people, to walk upon a narrow plank at a great height? On the same plank, laid in the middle of a broad floor, there is no difficulty at all. It is because the impressions made upon our sight, when we move on a single plank, are such as we are **not accustomed** to, and they do not guide us well. By *training*, Blondin learned to walk upon a tight-rope with a man on his back, and even with his eyes blindfolded, over Niagara Falls.

MUSCULAR SENSE.

This leads to the remark, that not sight only guides us in walking. Hearing and touch assist; and the blind make constant use of both. But Blondin must have depended chiefly, when on the tight-rope blindfolded, upon another sense; the **muscular sense.** By this we are made aware of the *kind, direction*, and *amount* of force used by any of our muscles. Put a book upon your hand, and guess what its weight may be; or put one on *each* hand, and say which is heavier. Such judgments are formed by aid of the muscular sense.

Skating furnishes the best example of the use of this sense. A skater needs his sight only to know that nothing is in his way on the ice. Touch

cannot guide him, because the soles of his boots or shoes, and the narrow, stiff irons of his skates are between his feet and the level ice, which is all the same, whichever way he turns.* A blind man might learn to skate perfectly well, by his muscular sense alone, if he could be made certain of a wide space, with nothing in the way.

CEREBELLUM.

This is a partly separate portion of brain; behind, and in Man and the higher Apes below, the cerebrum.

Fig. 68.

THE CEREBELLUM.

m, Medulla Oblongata. *c*, Pons Varolii. *w*, Hemispheres of Cerebellum. *i*, Middle notch. 3 to 7, Nerves.

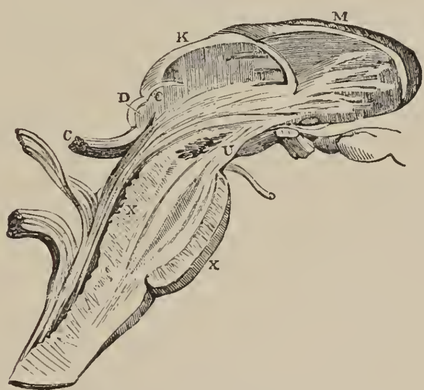
Contrary to the opinion of the phrenologists, who took quite a different view, observation, reasoning, and experiment have made it probable that the **cerebellum** has to do with regulating **voluntary motion.** Animals whose movements are active and somewhat complicated have it largest; those of simple motions, smallest. The Bear, which can stand on its hind feet and *hug* with its fore-limbs, has a larger cerebellum in proportion than the Dog, which always behaves (unless *taught* "tricks") as a quadruped; and it is larger still in the Monkeys, which are wonderfully nimble climbers. Among Birds, it is largest in swift and varied fliers, as the swallow; smallest in clumsily flying species, such as the Pheasants, Partridges, and domestic Fowl.

* Nearly the same thing is true of the *bicycle-rider;* but he makes more use of sight than the skater does.

MEDULLA OBLONGATA.

Already it has been explained that **breathing and swallowing** appear to depend for their regulation upon the **medulla oblongata.** Both of these are like those actions which the **spinal marrow** regulates, in being usually **automatic,** and in serving purposes connected with mere **living,** not *thinking,* which is done in the brain. But we need to have some control over breathing, for use of the voice, and to hold our breath under certain circumstances. Also, it is of great advantage for the will to have power to control the first part of the act of swallowing. So the medulla oblongata is placed as a link **between** the brain above and the spinal cord below.

FIG. 69.



MEDULLA OBLONGATA.

M, Corpus Striatum. K, Thalamus. C, D, Corpora Quadrigemina. X, Pons Varolii.

The **pons** (Pons Varolii) (X, Fig. 69) is a *bridge* across (**under** in the upright position of the body and brain) the medulla oblongata, from side to side of the cerebrum and cerebellum.

The special uses or functions of the **pons** have not been made certain. Our readers will have noticed, that much is yet to be learned in regard to the functions of a number of the parts of the body; and especially about the different portions of the brain. Nevertheless, what we do know is of interest and value; and Physiology is a constantly advancing science.

IDEAS, EMOTIONS, AND WILL.

Most persons suppose, with the phrenologists, that our **knowing** and **thinking** powers are located in the front part of the brain, and the **affectional** and **emotional** feelings in the back of the head. But it appears to me more probable that, instead, the **emotions** are connected with the **anterior**, and the **intellectual** powers with the **posterior**, portions of the brain. Reasons for this belief are given in another work.* The **will**, or what we call **self** (*ego* of the philosophers), appears to have no special seat or organ; but to be consciously present wherever any of our faculties are in action. If any one treads on my toe, or mashes my finger, I *seem* to be *there*.

Even our **minds** are to some extent **automatic**. Our thoughts wander on while we are awake, with or without our consent. In dreams, they make still stranger excursions, which seem real because all other impressions are shut out. If we *try*, we can **dwell** on some one thing or thought, keeping it before us; and that is about all the power **will** has over **thought**.

Emotion is still more *spontaneous*. Tears flow, not because we *wish* them to, but because something "touches our feelings." Passionate anger may be repressed, not by a direct effort of the will, but by thinking of, or looking at, something which will divert our minds from the object of wrath.

OUR SPECIAL SENSES.

These (besides the *muscular sense*) are **Sight, Hearing, Smell, Taste,** and **Touch.** The last, although special in the fact of differing from the others, is general, in so far as it is common to many different parts of the body.

SIGHT.

What is light? It is a **wave-movement** of the very thin, subtle matter (called **ether**) which fills space; extending as far at least as the remotest star, which is a long way beyond the sun. Let us try to illustrate the subject of wave-motions. Throw a pebble into a pond; the water breaks into waves around the place where it was struck, these circling,

* Hartshorne's Anatomy and Physiology for Medical Students; Second Edition, p. 293.

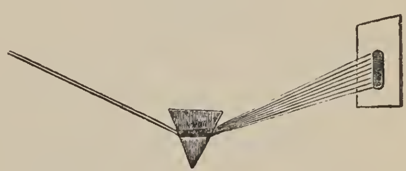
one beyond another, till they reach the shore. A church-bell is tolled. If you were to touch it while it is giving forth a long note of sound, your hand would feel the quivering vibration: and the air at the same time beats upon your ears with **waves** of sound. **Air** (as well as many other things) has **sonorous** vibrations. The subtle **ether**, so much lighter and thinner than air that it cannot be weighed at all, has **luminous** vibrations. **Heat** also is ether-wave-motion. A sort of *gamut* (as musicians call it) there is: **water-waves**, large and slow; **air-waves**, smaller and quicker, from the lowest up to the shrillest note of sound; **ether-waves**, the lowest being those of heat, and the higher waves those of light.

Of the waves of heat and light, also, there is a regular scale. Put a rod of iron in a hot furnace, and watch the part just outside of the fire. For a while, although getting hot, it continues dark; there are then only the lower heat-waves. Soon it may be seen to grow red; showing the high heat-waves, passing into the lower waves of light. Then, in rapid succession, it glows with orange, yellow, green, blue, indigo, violet (these last too near each other to be readily discriminated), and at last, *white heat!*

Red, orange, yellow, green, blue, indigo, and violet. That is the **order** of the seven colored sets of waves, or **rays**. We see them so in the rainbow.

All these rays **together** make **white light.** By passing sunlight through a glass prism, it is divided into the seven rays. This **bending** of rays so as to take new directions is called the **refraction** of light. *Red* rays are *least* refracted; *violet* rays *most;* the others come in order (as above given) between.

Fig. 70.



REFRACTION, THROUGH A PRISM.

The arrangement of divided rays obtained by means of a prism is called a **spectrum.** A beautiful study (that of the *spectroscope* and its uses) is connected with it. But, beyond the violet end, there are yet shorter (higher) waves, which we do not see, but which have *chemical* effects; of the kind which light shows, so usefully, in taking *photographs* (light-pictures).

If you place a straight stick slantwise in a stream, or in a vessel of clear water, it will *appear bent* from the place where it enters the water. Or, put a quarter-dollar in the bottom of an empty cup, and move slowly back until you just don't see the coin over the edge. Then ask

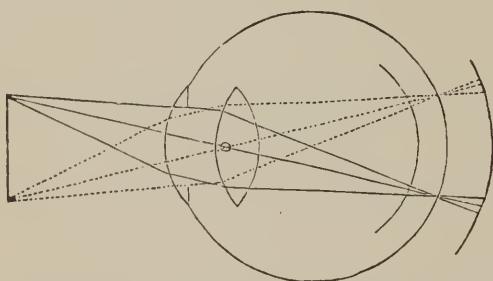
some one to fill the cup with water. The coin will seem to *rise*, so that you see it plainly.

Both of these last are examples of **refraction of light**. If you let fall a stone, attached to the end of a string, into the water in which you have placed a slanting stick, the string will then be *perpendicular* to the surface of the water. As you see the stick by the rays of light coming from it to your eyes,—the rays coming *through* the *water* from the stick are shown to be bent *away from* the perpendicular string. Then we have a rule, or law, namely:

A ray of light, passing **from a denser** material (as water) into a **rarer** material (as air), is refracted **from** the perpendicular. A ray passing **from a rarer** into a **denser** medium, as from air into water, is refracted **towards** the perpendicular.

Our eyes are optical instruments; more wonderful than any made by men. Rays of light passing through them are *refracted*, just as they

FIG. 71.



REFRACTION AND INVERSION OF RAYS OF LIGHT.

are through the lenses of telescopes or microscopes; so as to make images or pictures within the eyes.

Reflection of light is also important. Its rules or "laws" are like those of the reflection of other things. Throw a ball straight down on the floor and it bounds straight up again. Throw it *slantwise*, and it will rebound in a line slanting *just as much the other way*. **Incidence** is the long word for *striking*. The "line of incidence" is the direction in which a thing is made to strike. Then we have a *law* about this. **The angle of incidence is equal to the angle of reflection.** This is true of ball-throwing, billiard-playing, of sound (in *echoes*), and in the reflection of light. You can observe it any time in a looking-glass.

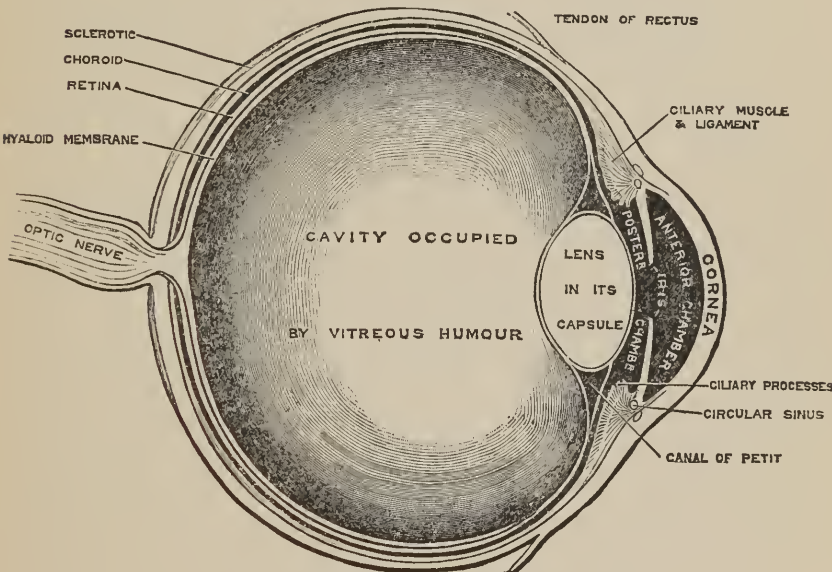
Schoolboys sometimes make this experiment with a bit of broken looking-glass, which they get into the sunlight, so as to throw a bright ray into the teacher's or some schoolmate's eyes.

We see things by the light which they **reflect**. White things reflect

the *whole* light. Red things reflect only red rays, and keep (take up, absorb) the remaining rays; blue things reflect blue rays, and so on; black things (if *perfectly* black), *none.* As black things keep or absorb all the rays or waves, those waves do not cease their motion; but they are *slowed* (so to speak) into *heat*-waves. Hence a black hat is a very much hotter thing to wear under a summer's sun than a white hat. White is the *coolest of all,* for the same reason. Red flannel, worn as an *under* garment, is no warmer than white flannel; but a red-flannel shirt with nothing over it is warmer than white while the sun shines upon it.

Take all the red rays out of white sunlight, and what is left?

Fig. 72.



SECTION OF AN EYEBALL.

Green. If you take all the green out you have red left. These colors are therefore called **complementary** colors to each other. Blue and orange are likewise complementary colors; and so are yellow and purple.

It is well known that in dresses, carpets, etc., *complementary colors always look best together;* as red with green, yellow with purple, blue with orange. This we commonly call the *contrast* of colors.

We may **reverse** the separation of colors by the prism, simply by throwing them so as to pass in the *opposite way* through another prism. If in the *same* way, they would be parted still more widely. Or,

paint all the seven colors, like spokes on a wheel, upon a round piece of card-board, and make the wheel revolve rapidly. As the colors run together in our eyes, their combination makes the wheel look white (or nearly so—not quite, because the colors are not perfect).

Transparent bodies let almost all the light go through them. **Translucent** ones allow a portion of the rays to pass through them, but not enough to see things by; **opaque** bodies let no light through at all. A window-pane is transparent; ground-glass is translucent; wood is opaque.

Light **travels** *through space* at the rate of about 190,000 miles in a second,—very much faster than sound passes through the air.

One can get a good idea of the make-up of a human eye by carefully examining the eye of a sheep, which can be obtained from a mutton-butcher. The eye is **almost a globe,** at the end of a stem, which is the **optic nerve.** In front, however, there is set in, like a round glass in a round frame, a slightly projecting part, the **cornea**—the window through which we look. It is quite transparent.

Examining the round frame or sash of this small window, we find it formed of a thin outer coat (**conjunctiva**), a thicker one (**sclerotic**), another containing blood-vessels, and black within (**choroid**), and a very delicate one innermost of all, connected with the branching of the optic nerve (**retina**).

When a ray of light strikes upon the eye, it first passes through the **cornea**; then through the front chamber of the **aqueous humor** to the opening called the **pupil,** surrounded by the **iris,** which draws together and makes the pupil smaller when the light is bright, and opens wider when the light is weak and faint. (Cats, by the way, have a pupil, not round, but a sort of *slit;* this shuts up closely in the daytime, and opens wide at night, so that they can see when, to us, it is dark.)

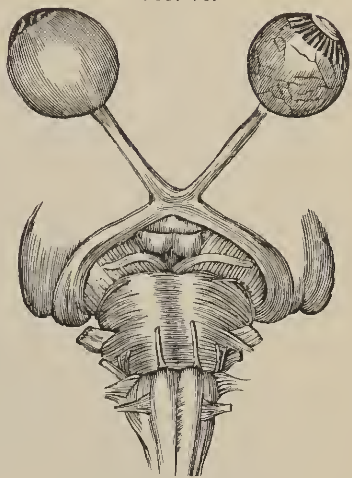
A little way behind the pupil is the **crystalline lens.** Next to that comes the large chamber of the **vitreous humor,** and then the **retina.** On this, like the "sensitive-plate" in the photographer's box, the *sight-picture* is taken. This picture must be **upside down,** because the rays cross each other at the pupil. (See Fig. 71.)

Yet we do not **see** things upside down. This is because we follow the rays, in our sight, to **the place they come from.** So, when rays are reflected from a looking-glass, giving us an image of an object, that object appears to be *behind* the mirror; *following back the line* of reflection, as far as the object itself is in front of it.

With two eyes, we see but one image. We explain this in two ways. First, the optic nerves **join** each other (as no other pairs of nerves

do); also, they have filaments which go **across** from the *right* eye to the *left* side of the brain (*tubercula quadrigemina and thalamus*), and from the *left* eye to the *right* side of the brain; besides those which pass from each eye to **its own** half of the centres at the base of the brain. Thus the two nerves, right and left, **combine** in their report (so to speak) of the impressions made upon the two eyes.

Fig. 73.



THE OPTIC NERVES.

Secondly, the eyes (which do not, in Man, really stand out in such different directions as they are made to in Fig. 73)* are directed towards the same object, so that straight lines drawn through the pupils of the two eyes perpendicularly to their corneas (making the *visual axes* of the eyes) will **meet in the same point** of the object. The two images formed on the two retinas will therefore correspond, and make one picture.

When any one **squints** (is cross-eyed) the axes of the two eyes do not meet on any object looked at, and the images do not correspond. A person so affected (with **strabismus**, as oculists call it) **sees double**; but he gets the habit of giving **attention** to *one* of the two images (or apparent objects) and neglecting the other. The same inconvenience results in another way, when the **refraction** of the two eyes is not the same; one eye being far-sighted and the other near-sighted. To this subject some attention will be given in a later part of this book. We can put our eyes out of correspondence for a time, by pushing one eye to one or the other side with a finger; or by "looking cross-eyed" on purpose. This last is not, however, a good thing to do often, lest it become habitual.

Looking at a **far-off** prospect, or at the blue sky (if not too dazzling), one's eyes feel a sense of **repose**. An **effort**, usually slight, is made in bringing our sight to bear upon anything **near** us, as in reading a book. We can cause the effort to become quite perceptible, by gradually moving a book nearer to our eyes, until it is *too* near.

Our sight then has to be **adjusted** for near objects.

This is done by changing the **form** of the **crystalline lens.** Before age has hardened it, the lens is somewhat elastic. When left without

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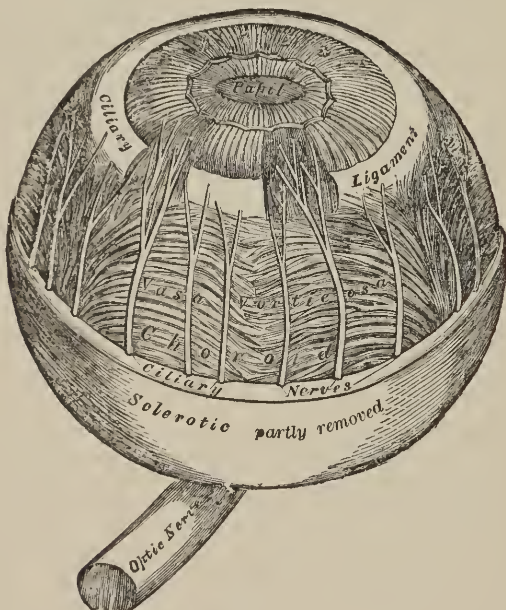
* That figure represents rather a dissected, separated preparation of the parts; not their exact appearance and position.

pressure, it is moderately convex. Being surrounded by the *ciliary ligament* (Fig. 74),* this pushes in its surface, making it flatter, that is, less convex in front. A muscle, not shown in either of our figures, called the **ciliary muscle,** when it acts, draws this ligament away; and thus allows the lens to bulge out more, or become more convex.† Let us remember, then, that rays going into a denser medium are bent **towards** the perpendicular. Passing through a pane of glass, their direction is little changed, because it is flat and thin; and the slight change that occurs is rectified, as the ray soon goes out from the dense glass to the rare atmosphere again. But, take a sheet of paper and bend it over into

Fig. 74.



THE CHOROID COAT, IRIS, AND PUPIL, ENLARGED.

an arch; you will see, then, that *its* perpendiculars must **point inwards;** and rays bent towards them would **meet** somewhere in a centre. This is what happens with a convex lens; and the centre is its **focus.** Then, the more convex the lens, the more the rays are bent. And, as the **image** is made, in sight, by all the rays from the object being **focused**

* The *lens* is, in that figure, *hidden* behind the iris.

† This is the account of it given in the Text-books on Physiology. It is not, however, quite certainly the true explanation. It seems to me not impossible that, instead, the ciliary muscle acts by *compressing* the circular margin of the lens, so as to make its central portion *bulge forwards;* that is become more convex.

upon one surface (or plane), the **more convex** the lens the **sooner** (*nearer behind the lens*) the rays from any object make their image.

Rays from distant objects are **nearly parallel.** Those from **near** things going to the eye must **diverge** ; more or less according to their nearness. Now *parallel* rays are, so to speak, *easily* bent to a focus; *diverging* ones (spreading out from a centre) much less so. Therefore the **more convex** lens is wanted for **near** objects, to bring their rays to a focus **on the retina.** Suppose the eye to be *too long*. Then the image will fall *in front* of the retina; and the rays, crossing each other, will cause imperfect sight. This is **near-sightedness.** It may be corrected by using **concave** glasses, which spread the rays and throw the image farther back. A near-sighted person holds a book close to his nose (if he wears no glasses), because thus he makes the rays from it diverge a great deal, and pushes their focus back so as to reach the retina.

Too *short* an eyeball has the image to fall *behind* the retina. This (**long-sightedness**) is to be corrected by **convex** glasses, bringing the rays sooner to a focus. Of this, also, more hereafter.

We must not forget that, under the stimulus of more strongly reflected light, the **iris contracts** when we look at **near** objects. This shuts off the *outermost* rays, which diverge too much, for the size and shape of the eyeball, to make a clear picture (**spherical aberration**). Also, the crystalline lens is most dense at the centre; so as to refract *most* the rays which are nearly parallel, and *least* the outer rays.

In using imperfect glass lenses, sometimes white light is broken up (as in the prism) into colors. This is called **chromatic aberration.** It is prevented, in our eyes, as it is in good instruments by opticians, by the different transparent parts *correcting* each other's different refraction of the color rays making up white light.

Every eye has a *blind spot*. To prove this, make two dots on a piece of paper, about two inches apart. Then close the right eye and look at the *right-hand* spot with the *left* eye, holding the paper about eight

inches from the eyes. The *left-hand* spot will then disappear. This blind spot is where the optic nerve enters the eyeball. The centre of *most distinct* vision is a yellowish spot, about at the middle of the retina.

How do we know **how far off** is anything that we see? Only by using our knowledge, if we have such, of its **size,** and judging by **experience** of the effect of distance upon that size. Standing near a railroad track, when a train of cars is approaching, we can see it grow-

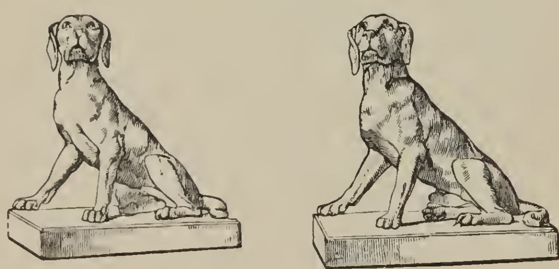
ing rapidly larger as it comes near to us. We can guess its distance at any moment, because we are familiar with the size of engines and cars. But the distance of a cloud overhead, or of the sun, moon, or stars, we can form no estimate of, from their appearance; as we have no definite notion of their size. So it is with all other objects.

Similarly, if we know the **distance** from us of a house, tree, or mountain, we can estimate its **size**; otherwise, not.

In a fog, the *dimness* of things produces one of the effects of distance; and, supposing objects seen to be far off, we imagine them to be larger than they are. On the contrary, in an uncommonly clear atmosphere, everything seems near and relatively small.

An image formed upon the retina **remains** there for a moment; not so strongly impressed as to interfere with another object, but so as sometimes to blend or combine the two images. On a white card, draw, on one side, the figure of a man, and on the other a horse; or on one side a

FIG. 75.



STEREOSCOPIC PICTURE.

bird and on the other side a cage. If you can then fix the card so as to revolve swiftly, you will see the man and horse, or the bird and cage, both in one picture. When a burning firebrand is whirled around in the air at night, it looks like a circle of continuous flame. The same fact about images explains the approach to whiteness of a wheel painted with the seven colors of the rainbow, and made to rotate rapidly.

A pretty experiment is this: fix your eyes intently for about half a minute upon a piece of bright red or clear green stuff (of any kind) laid upon a sheet of white paper. Then take the bit of colored stuff suddenly away, and you will see in its place a figure of the same size and shape, but of the **complementary color**.

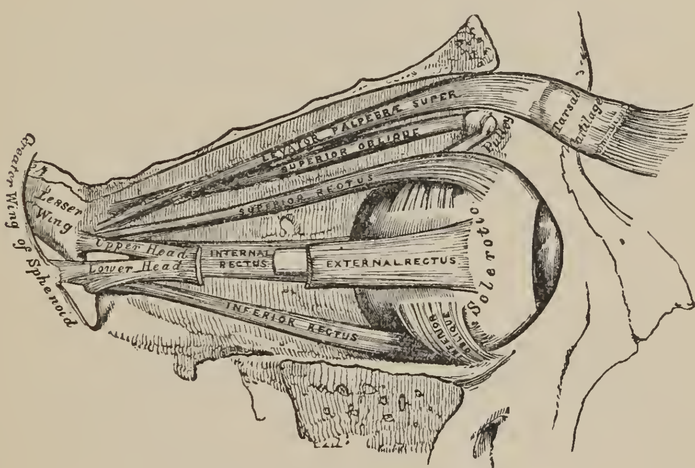
If the stuff be red, the **spectrum** following it will be green; if it be green, a red spectrum will appear; and so on. It would take too much space here to explain this and similar facts about **color-spectra**.

Stereoscopes are now familiar to most people.

They act by throwing **two pictures**, representing the same object, **into one**, by the refracting power of a couple of lenses, shaped and placed properly for the purpose. Some persons (not many) can so exaggerate the action of the muscular apparatus of their eyes, as to throw the two pictures into one without a stereoscope. The effect, in either case, is to make a picture which **stands out solid**, as it were. This is especially successful with views of things which are really solid; as statues, monuments, and buildings.

Adjustment of the eyes to a near object requires, besides the action of the ciliary muscle upon the lens, the **convergence** of the eyes; that is, turning both eyes enough inward to look right at the object. This is done by two of the short and *straight muscles* of the eyes; the **internal** straight muscles of the two eyes.

FIG. 76.



MUSCLES OF THE RIGHT EYE.

Other movements of the eyeballs also are effected by their muscles, which are six in all, for each eye: **internal straight** (rectus internus), **external straight** (rectus externus), **superior straight**, **inferior straight**, **superior oblique**, and **inferior oblique**. The last two **roll** the eyes slightly. The superior oblique has its tendon to go through a **pulley** at the inner front edge of the orbit of the eye; which reverses the direction of its action.

A peculiarity of the *straight* muscles of the eyeball is that very often the **external** of one eye acts with the **internal** muscle of the other, and *vice versâ*. For example, to look towards the right, we use the *external* straight muscle of the right and the *internal* straight muscle of the left eye.

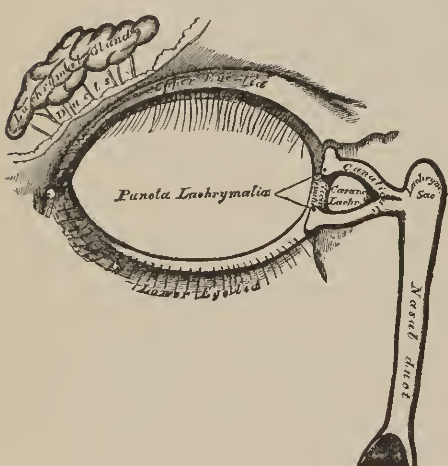
In a cross-eyed person, **one** of the straight muscles (external or internal) of one or both eyes is **too weak**; and the opposing one gets the advantage, pulling the eye or eyes in its direction. Most common is "*internal* strabismus," in which the two *internal recti* muscles draw the eyes too much inwards. Surgeons sometimes remedy this, by **dividing** the **stronger** muscle, with a fine knife, so that the weaker one is enabled to keep up its proper proportion of action.

TEARS.

These flow from the **lachrymal gland,** which lies in the upper and outer part of the orbit of each eye. Constantly there is a gentle flow of moisture over the eyeball; the slight excess of which runs along the gutter or channel between the gristly (cartilaginous) edges of the lids, to pass down from the inner corner of the eye into the nose by the **lachrymal duct.** Occasionally this duct becomes narrowed, and the tears overflow all the time. When very troublesome, relief may be given to this by stretching the duct with a small silver tube.

Weeping results from a large excess of secretion by the lachrymal gland, under strong **emotion.** The effect of emotion is to increase the flow of blood towards the front part of the brain; this finds relief from the escape of some of the watery part of the blood through the blood-vessels of the tear-gland in its secretion. Grief that is "too deep for tears" is the most apt to wear upon the health for want of that relief.

Fig. 77.



TEAR-GLAND AND DUCT.

Our **eyelashes,** which curve two ways, serve somewhat the same sort of purpose as the "cow-catchers" in front of locomotives, to keep things from getting into the eyes. The **eyebrows** turn perspiration upon the forehead away from the eyes, besides aiding in deadening the force of blows which may threaten

them. **Winking** is a generally **automatic** action (although controllable by the will) of the round (orbicular) muscle which closes the eye. It spreads the tear-moisture over the ball from time to time, and, when anything comes very near to the eye, we wink spontaneously to shut it out.

As the eyes, the windows of the head, are very much exposed in their situation, and are extremely sensitive and delicate, the sufficiency of these arrangements for their protection is shown by the rarity of serious injuries to them. Many a person gets "a black eye," but that is on the *outside* only. How seldom, comparatively, does any one have an eye "put out" by a blow!

HEARING.

If a clock should be placed under an air-tight "receiver," or any kind of tight cover, and the air should then be all drawn out of this by means of an air-pump, we would probably hear it tick and strike, because the sound would be carried by the base upon which it stood. But if it, or a bell, be hung by a slender cord in a receiver emptied of air, no sound made by it will reach our ears; because there is **no air to vibrate**; and all ordinary sounds are brought as **air-waves** to our ears. Yet, as just said, or implied, **solid** bodies also may vibrate and give out or carry sounds. Put your ear down on a piano, or a musical box, while it is playing, and you will find the sound to be much louder than when listening apart from it.

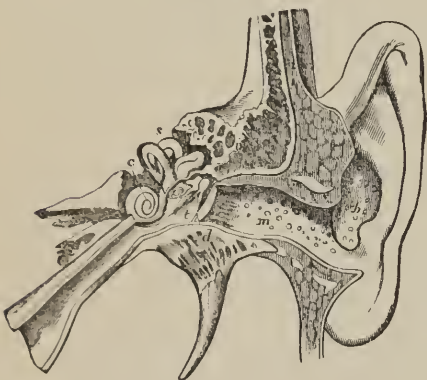
Sound goes through **liquids** also. Its rate of movement through the air is a little over eleven hundred **feet** in a second; through water, about four thousand feet in the same time; through solids, still faster, but not the same in all. **Dense** bodies, such as iron and other metals, convey it faster than wood; and a loose, porous body, like sponge, with much less rapidity.

Light, as was said on a previous page, travels very much faster; about 190,000 **miles** in a second. Why does thunder often follow so long after the lightning flash? Because the clouds, whose electrical discharge we see and hear, are at a considerable distance; and the flash is seen with the speed of the progress of *light*-waves, while the thunder-peal reaches our ears by the slower sound-wave movement. If the clouds be right overhead, the lightning and thunder will come both at once. Watch the cutting down of a tree a few hundred yards off; you will see the axe fall some moments before the sound of its blow is heard; and the same with the firing of a gun at a distance; you see the flash before you hear the report.

The **highest** notes of sound we can hear are made by 38,000 vibrations in a second; the **lowest**, by twenty-seven or twenty-eight vibrations (waves, impulses) in a second. Probably insects, and some other animals, may perceive (either by hearing or by very delicate *touch*) wave-movements yet more rapid.

We have already, under **Anatomy**, briefly described the **outer, middle**, and **internal** ear. The outer is the cartilaginous, flexible portion; which, in the dog, horse, and some other animals, can be turned about in several directions. We have, instead, fixed ears (with **undeveloped** ear-moving muscles), but so formed that sounds from all quarters are **poured** together into the **meatus**, as the passage is called. The hairs and wax in that entrance to the ear seem to be intended to keep out insects; which very seldom find their way in.

Fig. 78.



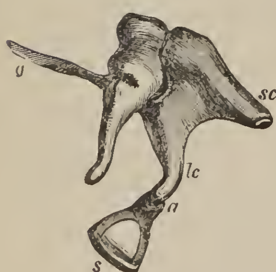
THE EAR.

b, Part of the outer Ear. *m*, Passage called External Meatus. *d*, Drum-membrane. *t*, Interior of Drum, called Tympanum. *e*, Eustachian tube. *s*, Semi-circular Canals. *c*, Cochlea.

At the bottom of the *meatus* is the **drum-membrane** (**membrana tympani**). Beyond it is the drum or **tympanum**; hollow, but containing a chain of very **small bones** (magnified in Fig. 79), reaching from the **membrana tympani** at its outside to the **membrane of the vestibule** of the internal ear.

The handle of the *hammer-bone* (**malleus**, *g* in Fig. 79) is fastened to the *membrana tympani;* then comes the *anvil* (**incus**, *sc*, *lc*, same figure), the little *round bone* (**orbiculare**, *a*) and the *stirrup* (**stapes**, *s*) which is attached to the *membrane of the vestibule* of the inner ear. Three very small muscles tighten or loosen these together.

Fig. 79.

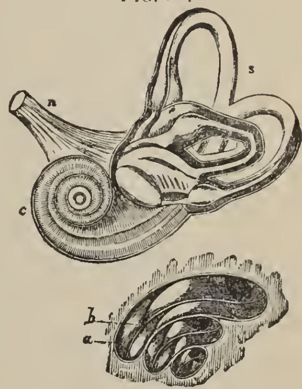


LITTLE BONES OF THE EAR.

The drum of the ear is air-tight only on its outside; it communicates with the back of the throat by a channel in the **temporal bone** called the **Eustachian tube** (*e*, Fig. 78). By this, air can enter it, to *balance* the air pressing or beating upon the outer membrane of the drum through the *meatus* of the external ear. This

is important. When a powder-mill explodes, a house near it, with all its windows and doors shut, will have all of the windows shattered; one with several of them open, will at least suffer less damage. So, during battles, gunners firing off big cannon *open their mouths* at the time of a discharge, so as to let plenty of air in by the Eustachian tube to the middle ear. If this tube is swollen or choked with phlegm from a cold, the hearing is for the time impaired.

Fig. 80.



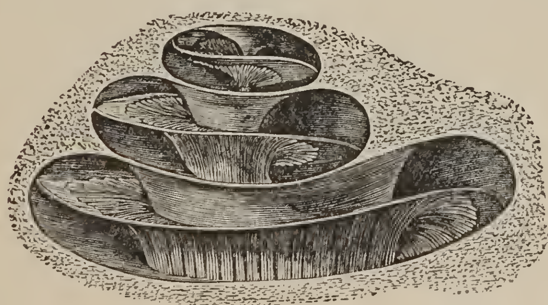
LABYRINTH OF THE INTERNAL EAR.

n, Auditory Nerve. *s*, Semi-circular Canals. *c*, Cochlea. *a*, Wall of the Cochlea. *b*, Spiral staircase.

Three parts of the **internal** ear (making together the **labyrinth**) are, the **vestibule**, **semi-circular canals**, and **cochlea**. At the **vestibule** ends the chain of little ear bones; the stirrup fitting by its foot into an oval window in the bony wall. Another *round* window, covered by membrane, opens from the snail-shell-like cochlea into the tympanum or middle ear. In the vestibule are some tiny gravel-stones (**otoliths**) whose use is doubtful. The vestibule, the cochlea, and the semi-circular canals are all filled with a **liquid**; and in this liquid are spread out the fine ends of the branches of the **nerve of hearing** (auditory nerve).

The **cochlea** is most remarkable for its **double spiral staircase**.

Fig. 81.



THE COCHLEA.

Waves of sound, striking upon the outer drum-membrane, are carried probably by the chain of little bones to the vestibule, and thence to the cochlea. Each wave enters at the broad foot of the staircase, and, it may be supposed, rolls up to its top, and then down the other side, to cease at the round membrane-covered window of the cochlea, opening on

the middle ear or tympanum. Along the edge of the middle spiral of this staircase there are arranged some thousands of little **rods** or **keys** (rods of Corti, seen only by aid of a microscope), which may respond to the different notes of sound, like the keys of a piano or organ.

The use of the **semi-circular canals** is not certainly known. The prevailing opinion is that they have to do with our **balancing** ourselves, especially in the erect posture. Animals in which they have been injured turn round and round, or over and over; and there is a disease of the labyrinth of the ear now and then met with (*Menière's* disease, so named from its first describer), in which the patient falls to the ground; generally inclining to one side more than the other.

We probably judge of the **direction** from which sounds come, partly by comparing the impressions made upon the **two ears**, and partly by the sense of **touch**, which is very delicate at **the openings of the ears.** Mice and bats, which are very quick of hearing, have a particularly large supply of nerve-endings in the lining of the external ear. Of the **distance** from which sounds reach us, we can only form an estimate from their loudness and character, as learned by experience. A skilful ventriloquist, by imitating the muffling of sounds in a closed box, or their softening by distance, and at the same time favoring the delusion by his words and actions, can readily deceive us, unless we are guarded against it.

Dulness of hearing, of slight or moderate degrees, may result from irritation of the *meatus* of the ear, causing the formation of **too much wax**; or from "a cold" inducing a **swelling** of the drum-membrane, or of the lining of the Eustachian tube (like that which produces *hoarseness* in the windpipe). More serious deafness may come from disease (as scarlet fever or small-pox) **partly destroying the drum-membrane,** or filling the drum with matter (**pus** or **mucus**), or eating away more or less of the little **bony chain** in the tympanum. **Total** deafness comes only from paralysis (loss of sensibility) of the auditory **nerve,** or of that part of the base of the **brain** to which it goes.

We can tell whether, in any case, it is this last kind of loss of hearing or not (as it, too, may be of various degrees—in old people it is often gradual), by trying the person with a watch or music-box. If the deafness is only from any of the other causes above mentioned, a watch can be heard tick, or a music-box to play, when it is placed between or against the teeth. In total *nerve*-deafness this will not make it audible.

We have now given as much space as the plan of this work will allow to the study of the structure and functions of the Human Body.

As needs hardly to be said, however, the body is not all. Man is more than an animal. Not in his bodily organs, nor even in his superior brain, but in the gift of an immortal spirit, is the crown and glory of Humanity. This is brought to its normal destination only when the will, dominating over all the bodily and mental faculties, and freed from degrading imperfections, becomes assimilated, in its free choice, to the Divine Will.

HYGIENE.

THE SCIENCE AND ART

OF

THE PRESERVATION OF HEALTH.

115

HYGIENE.

OUR present subject derives its name, in English, from the French word, *Hygiène.* This may be traced back to a word meaning healthy, in the Greek. Hygiea, the ancient goddess of health, was the daughter (some say the wife) of Æsculapius, the god of Medicine.

From the earliest days, men must have observed, more or less exactly, the favorable or unfavorable influences of the circumstances under which they lived. As an art, or practical study, in its rude beginnings, Hygiene must have preceded Medicine, and even Surgery. The early temples of Æsculapius, before Hippocrates, were *sanitaria* rather than medical schools. Hygiea was named, with other deities, in the oath which every physician was required to take as one of the Asclepiadæ: "By Apollo the physician, by Æsculapius, by Hygiea, Panacea, and all the gods and goddesses."

Hippocrates wrote the first hygienic treatise now extant—on *Airs, Waters,* and *Places.* He therein pointed out the effects of climates and localities, not only upon health, but also upon the characters of races of men; anticipating, at so early a date (400 B. C.), the conclusions arrived at in recent times by Montesquieu, Michelet, Guyot, and Buckle. Positive sanitary measures were probably first instituted by Acron of Crotona, of the school of Pythagoras, who is said to have dissipated the cause of a plague at Athens by means of fires burned in the streets. Empedocles afterwards found it possible to destroy or impede the action of malaria; in one instance by draining a swamp, and in another by building a high wall to protect an exposed town. Phidias provided a water-supply for Athens by means of a tunnel under Mount Athos, said to have been eighteen feet in diameter. Herodicus was so famous for his application of gymnastics to the improvement of health that Plato accused him of doing an ill service to the state by keeping alive people who ought to die, because, being valetudinarians, they cost more than they were worth to the community. The Spartans reversed this, in their custom of exposing young children to the elements, whereby

only those survived and grew up who were possessed of natural hardihood.

Ancient Rome showed an appreciation of sanitary art by extensive drainage of the base of the hills on which the city was built; by the immense sewer, *Cloaca Maxima*, of which a part is left, the oldest ruin in Europe, thirteen feet in diameter at the outlet; by the aqueducts; by suburban interments, whose number is still attested all along the Appian Way; and by the appointment of officers (*ædiles*) whose duty it was to inspect and regulate the construction, with a view to salubrity and safety, of all private and public buildings. In Egypt, the great pyramid of Cheops has an arrangement showing an early recognition of the principles of ventilation, applied to its interior chambers. Embalming the bodies of the dead, not only of men but of animals, however it may have been associated with religious ideas, is so well adapted to the prevention of insalubrity in a populous land in a tropical climate as to make it appear likely that it sprang, in part at least, from the sanitary sagacity of the priesthood. Since a resemblance is traceable in many particulars between the Mosaic ceremonial law and the usages of the ancient Egyptians, it is likely that some measures for the preservation of health, prescribed in the Levitical code, corresponded with usages known to the Israelites while in the land of bondage. Moses, however, must have much extended the provisions required for the care of the health of his people. His regulations concerning food, ablutions, and other purifications, and segregation of persons having certain diseases, were precise and imperative.

All the most enlightened nations of antiquity held physical culture in high estimation. Socrates, the philosopher, was of powerful bodily frame. Plato also was a superior athlete, and so were Pericles and Alcibiades. It is not altogether improbable that the intellectual supremacy of the Greeks was in part owing to their sedulous care of the *whole organization*, brain and body together. In most of the cities of ancient Greece, public baths existed for the poor as well as the rich. Rome also had, at one period, hundreds of private and public baths; some of which, as those of Caracalla, were palatial in grandeur. Although at first designed for health, these afterwards degenerated into means for effeminate luxury; as did the *gymnasia*, at last, into scenes of gladiatorial combats of men and beasts.

In the School of Salernum, in Italy, the oldest medical school of Europe, founded in the ninth century, instruction was given upon the prevention of diseases and the preservation of health. That institution gave forth, in the twelfth century, a very remarkable treatise, the *Regimen Sanitatis Salernitanum*, a poem on the maintenance of health,

in rhyming Latin verses. Many of the precepts in this "Code of Salernum" are sound and good; some of them have passed into almost proverbial modern use. The institution of *quarantine*, in the fourteenth century, in Italy, to exclude the plague, was an event in the history of sanitary progress. From Florence this method of restriction of intercourse with infected places spread, first to Venice and Sardinia, and afterwards throughout Europe.*

Jenner's introduction of *vaccination*, for the prevention of small-pox, is perhaps the greatest of all the triumphs of "preventive medicine," as sanitary science is sometimes, and in this case at least not unfitly, called. Vaccination dates from 1798. The other benefits conferred upon mankind through the advance of knowledge in regard to the *causes of disease*, and the conditions necessary for health, especially in *large communities*, have been obvious, great, and numerous.

In the time of the great medical author, Sydenham (1624–1687), the largest part of the mortality of London was produced by four diseases,—plague, small-pox, scurvy, and dysentery. Of these, the first has long ago disappeared from Great Britain and the continent of Europe; the second has been, by prevention, shorn of most of its destructive power; the third is now seldom known except in places remote from civilized life; and the fourth is at least very much less mortal than formerly, especially in cities. Macaulay, in his *History of England*, estimated that the difference between London in the seventeenth, and the same city in the nineteenth, century is as great in regard to mortality as between that of the time of prevalence of epidemic cholera and that of ordinary years. In Constantinople, in 543 A. D., 10,000 people died daily during one season of plague alone; in 1665, 68,000 died of that disease in the city of London. In 1685, not a sickly year, the deaths in London were one in twenty of the inhabitants; now they average annually about one in forty. In France, in 1772, the annual proportion of deaths was one in twenty-five; in 1846, one in forty-five. The mean duration of life in France, in 1806, was 28½ years; now, 34½ years. At Geneva, the mean probability of life in the six-

* The first occasional prohibitions of maritime intercourse on account of the plague were made at Florence in 1348. Viscount Barnabo enacted the first peremptory regulations at Venice, 1374. The earliest legal code of quarantine was put in force at Venice, 1448; the first lazaretto was established in Sardinia, 1453. A Board of Health was organized in Venice, 1485. Bills of health for vessels were first made out in 1527; they became general at European ports about 1665. Regular quarantine was not enforced in England before 1710. William Penn, as early as 1700, instituted a quarantine law at Philadelphia. The term "quarantine" is derived from the Italian *quaranta*, forty; this number of days of detention being apparently derived from the time of purification prescribed in certain cases under the ancient Levitical law.

teenth century was about twenty-one years; in the seventeenth century, twenty-five to twenty-six years; in the nineteenth, about forty years.

Life may be safely said to have been, on the average, in civilized countries, prolonged twenty-five per cent. during the last fifty years. While improvements in medical and surgical practice have, no doubt, had their share in effecting such a result, the greater part of this very important change may be ascribed to increased knowledge and appreciation of the laws of health. Yet much remains to be done before the ideal of perfect sanitation is attained. Yellow fever and cholera are still at times the deadly scourges of cities and of some other places; malarial fevers render a few localities almost uninhabitable; and the mortality of towns, especially amongst young children, continues to be far in excess of what it ought to be were the conditions of health properly maintained. The best hope of the sanitarian and philanthropist is to be derived from the increasing interest in all that belongs to health, now prevailing everywhere amongst educated men and women, both in Europe and in America. No subject has, of late years, advanced more rapidly in public interest, or in the actual development of valuable practical knowledge concerning it.

Hygiene has its foundations in *Physiology* and *Sanitary experience.* What may be expected to favor the health of the body is known by the study of the action of its different organs; and such expectations are confirmed or corrected by observation of what really happens with individuals and in communities under various circumstances.

Our best way of considering Hygiene will be to follow very nearly a *physiological order*, taking up the different functions or operations going on in the body, and noticing what is good and what is bad for their proper performance, and thus for the maintenance of the health of the whole system. Certain subjects incidental to these will receive attention on our way.

HEALTHY BREATHING.

We have learned, in our **Physiology**, how, and for what end, breathing goes on, so long as life continues. Little thought is needed, therefore, for every one to see that for good breathing there must be **sound lungs** and **air-tubes**, and **strength** in the **muscles** of the chest, as well as **pure air.**

Consumption of the lungs interferes with breathing, because one lung is, or both are, greatly altered by the disease affecting them. *Pneumonia* is attended by short breathing for the same kind of reason, although the state of the lung or lungs is different, being that of active inflammation. *Croup* has for its worst symptom obstruction to the breathing, whose seat is *high up* in the windpipe, in the larynx or trachea. (See **Anatomy.**)

Strength in the muscles used in breathing is of course necessary. It seldom gives out until everything else in the body, including the heart, is exhausted. But we find the limit to what these muscles can do, even in health, when, in running, we "get out of breath." And sometimes, no doubt, in a very feeble person, this may, under exertion, cause death. For example, I remember the case of a patient prostrated by typhoid fever, who, while for a few moments unwatched, rose and walked into another room. He there fell dead. There is need of great care with such patients, to save the little strength they have, until the attack of disease is over.

Our breathing muscles can be **strengthened** by exercise. *All* active muscular movements of any part of the body, but especially brisk walking or running, quicken the action of the heart; and, as the blood then goes more rapidly through the lungs, it needs to be, and is, aired, accordingly, by quicker breathing.

At great heights, as in climbing mountains or going up in a balloon, the *thinness* of the air makes it harder to breathe. On lofty mountains, men and horses pant and are worn out with moderate exertion. Those, however, who live for years at such heights, become used to it, and their chests grow larger than those of lowlanders. This is said to be the case with the people of the highlands of Patagonia, in South America.

Using the *voice* a great deal (as in speaking or singing) in early life, promotes the growth of the lungs and the strength of the breathing muscles. Those who belong to consumptive families should, while young, be accustomed to active out-of-door habits; and for them, reading or speaking aloud or singing (vocal gymnastics) will be wholesome

exercise; that is, so long as they are well. When the lungs are actually diseased, active efforts of all kinds should be avoided.

Pure air, and *plenty of it*, is a constant necessity for health. The application of this truth belongs in many ways to our every-day life, especially, of course, within doors. Out of doors, in some places, the atmosphere is made unwholesome by what is called **malaria**, which is the cause of certain fevers; or by the infection or contagion of other diseases. These require to be considered hereafter by themselves. As several other important conditions of health are closely connected with the purity of the air, we may advantageously look at these together, making our next topic the **house** and its **surroundings.**

OUR HOMES.

We should need no Darwin to teach us that man is a part of Nature. Though sovereign in the creation, his is but a limited monarchy, with an unwritten but inexorable constitution, which he must obey, or suffer the penalty. Apart from human interference, there is in Nature a balance of formation and destruction, of life and death, food and waste, making a perfect natural economy everywhere. Man comes in with his artificial constructions, and sweeps away much of this economy of Nature. Under his tread the green earth grows bare. His habitations exclude multitudes of the lower and lesser creatures, whose ordained functions as natural scavengers are thus impaired or annulled.

Hence comes foulness of the earth, water, and air; stench, miasma, pestilence. A guerilla warfare seems to be waged all around the invader of Nature; yet man's conquest of the world is legitimate. What is wanting? Simply that our reason should be used in counting the true cost of civilization, and meeting all its conditions as they exist, wisely. We must maintain or restore the original balance of primeval nature, by providing for the reappropriation of the products of life and the results of death and decay around us.

Chiefly, the evils to be guarded against belong to the deterioration of the atmosphere and of drinking-water, under the influence of decaying matter. Every human being gives out constantly from his lungs, skin, and otherwise, about as much as is from day to day received by him as food, drink, and air of respiration. We take air and water, and grains, fruits, roots, flesh, etc., into our systems; we organize or consume them, and then throw them out again to be rapidly decomposed. The higher the life they have attained in us, the deadlier poisons they become in their effete molecular death. Thus *crowd-poison* breeds typhus fever, and promotes typhoid fever, diphtheria, cholera infantum, yellow fever, and malignant cholera; nay, gives special aid and sustenance to all contagious and epidemic disease-causes,—such as those of small-pox, scarlet fever, and the rest, and contributes greatly to the mortality from pulmonary consumption, pneumonia, and nervous affections, especially those of children.

How are we to live, then, not as wanderers of the forest, nor yet as hermits, but in society, without abridging our lives and multiplying the

"ills that flesh is heir to," is the question. The imperfection of the manner in which this question has been, so far, generally answered, may be judged of by a late account given by the eminent statistician, Dr. Farr, of the proportion between population-density and mortality, in the six hundred and nineteen districts of England and Wales, from 1861 to 1870. In seven groups of those districts (excluding London), the number of persons to a square mile is, respectively, thus: 166, 186, 379, 1178, 4499, 12,351, 63,823. The annual mortality for each 1000 inhabitants in the same districts is 17, 19, 22, 25, 28, 32, and 39. In other words, according to these results, the nearer people live to each other, the shorter their lives. In fifty-three districts, the average proximity of residents is 147 yards, and the mean duration of life is 51 years; in 345 districts the proximity is 139 yards, and the mean length of life 45 years; in 137 districts the proximity is 97 yards, and the length of life 40 years; in forty-seven districts the proximity is 46 yards, and life-duration 35 years; in nine districts, with an average proximity of 28 yards, the mean duration of life is 32 years. In Manchester, the proximity is 17 yards, and the mean length of life 29 years; in Liverpool, the proximity reaches the maximum of seven yards, and the duration of life its minimum average, 26 years.* This brevity of human life was exceeded, it is true, a hundred years ago, in many places, —an important improvement having, in our own time, begun, which needs yet to be very greatly extended almost everywhere.

Our question, "*How shall we have Healthy Homes?*" may be best considered in view of the following topics concerning human habitations: I. Situation; II. Construction; III. Light; IV. Warmth; V. Ventilation; VI. Water Supply; VII. Drainage; VIII. Disinfection; IX. Population; X. Working-Men's Homes.

SITUATION.

"God made the country, and man made the town." So wrote the poet Cowper. With more philosophy he might have seen that it was *meant* that man should build towns; only in this, as in everything else, he should obey the laws of his creation. We ought not to make our towns so different from the country as they are.

No doubt, for healthfulness of situation, a rural locality is usually the best; yet not always, for, near a malarious swamp, or a shallow,

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* Popular Science Monthly, March, 1879.

sluggish stream, causes of disease exist, from whose influence the densely built city may be free. Charleston city is, in most seasons, more safe from injury to health than the rice plantations of South Carolina. Near Philadelphia many now living remember how the region liable to autumnal fevers has been "crowded out" by the extension of the city, until now it can scarcely be said to exist within its large extent.

Suppose a person with unlimited means to desire to choose a salubrious site for a residence. He will reasonably leave the city. He will then be especially careful to avoid a malarious locality. Such will generally be found on low grounds of *alluvial** formation, and in the vicinity of marshes or sluggish rivers, where moist earth is exposed from time to time to the rays of the sun. Apart from specific "malaria," also, the soil has considerable importance. It acts by its absorption and radiation of heat, by the reflection of light, absorption of water, and movement of water through and under it; formation of dust, and its chemical character, affecting the air about it. Pettenkofer has shown that a cubic foot of soil may contain one-third of a cubic foot of air; and Boussingault has found in this "ground-air" a great deal of carbonic acid gas.† While in the ordinary atmosphere out of doors the amount of this gas is from 3 to 5 parts in 10,000, in the air of a field recently manured there existed 221 parts in 10,000; in forest land, 86; loamy subsoil, 82; sandy subsoil, 24 parts.

Worse gases than carbonic acid may permeate the soil under some circumstances. Graveyard air, as interments are generally managed, is known to be unwholesome in its influence. This results from the gases of decomposition which escape through the soil. Drains, cess-pools, and sewers, when allowed to leak or pour their contents upon or into the ground, pollute it so that it may, when saturated, give off very injurious effluvia. Prof. Pettenkofer mentions an instance of illuminating gas from a leaky pipe penetrating through the earth to a distance of twenty feet, and so saturating the basement of a house as to cause the death of one of its inmates.

It is wonderful, however, how much is done by the earth to purify the foulness which, by necessity or from neglect, is allowed to enter into it. This may well be regarded as one of the providential means of adaptation of the world we live in to the needs of its inhabitants.

But ground-water, near the surface, injures the healthfulness of a situation more frequently and largely than ground-air. Sometimes the

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* That is, not hard rock, but such as is made by the washing of rivers, etc., in past times.

† The same gas which is produced by breathing and by burning fuel in the air.

very efforts made to please the eye by picturesque effects may almost ruin a locality as to salubrity. Prof. R. Bartholow has shown * how this has been done in some of the suburbs of Cincinnati, not only by streets and roadways obstructing the surface drainage, but by artificial lakes, whose beauty to the eye is but a disguise for the accumulation of causes of malaria.

Dampness of soil, even if not specially contaminated, is unwholesome. It has been shown, both in Great Britain and in this country, to promote consumption of the lungs, besides the known liability of persons living in damp places to rheumatism and "colds." A certain relaxing effect, also, is felt by many people where the locality is damp, most of all in warm weather,—the very opposite of the bracing, tonic influence of a high and dry situation.

Of different kinds of soil, sand absorbs and retains very little water; clay ten or twenty times more; and "humus," or rich arable earth, forty or fifty times as much as sand. Hard sandstone rock and the harder limestones, as well as the solid granite and trap rocks, allow very little movement of water through them. Very frequently, too, these rocks slope so as to let the water run over them and drain away. Clay is more likely to lie flat, so as to have water accumulate upon it; hence clayey soils are apt to make damp situations. The worst soil of all for building is what is called *made ground*, composed of the refuse from various places, filth of houses, decaying vegetables, etc., carried and deposited to fill up low spots in the suburbs of towns. Observation shows that at least three years will be required for such earth to undergo the changes necessary to make it innocent of unwholesome emanations; and even after a longer period it is impossible to be sure of its healthfulness. Just as a question of health, we may, because of their porosity, prefer sand, gravel, or loose limestone to anything else upon which to build a house; although, even upon such ground a right construction is needful for this kind of security as well as for permanence.

Our ideal site may be, in order to combine the greatest sum of advantages, upon a gentle slope, or the side of a hill not too steep, looking in our part of the world towards the south or south-west. It must not, even though upon a height, be near a marsh or sluggish river-bank, as the vapors lifted by the morning sun and settling again with the decline of day, may be wafted by the winds hundreds of yards up the sides of the most beautiful lawn-covered hills. A grove of trees will, it is true, afford a very considerable protection from malaria, by intervening between a house and the source of its emanation. But, then, the inhabi-

* Lecture on the Hygiene of Suburban Life, 1878.

tants of such a locality must be very careful in their excursions, especially near sunset and sunrise, in the spring and autumn.

Many thousands of men are unable to make any such choice as we have mentioned, of a rural home. In the cities, also, there is much room for selection on the part of those who are not limited by want of means. Elevation, in some cities, as Cincinnati, Baltimore, and even Philadelphia, varies sufficiently to make quite an important difference. We should always, of course, when possible, choose the higher part of the town for a dwelling. A wide street will be the best. No street should be allowed anywhere of less width than twice the height of the houses upon it; although so stringent a rule is probably nowhere, as yet, enforced. The *least width at all tolerable*, in the poorest part of a town, should be fixed at the height of the highest dwelling upon the street.

A street with *trees* lining it is made thereby more healthy. There is no doubt at all that the leaves of all ordinary plants and trees improve the air for our breathing by taking from it carbonic acid gas, and returning to it fresh oxygen. On the sunny side of the street, too, it is advantageous to have the glare of an American noonday mitigated by a moderate, but not excessive, shade. A corner of two streets will afford the best circulation of air.

Houses erected back to back are always to be avoided. Squares built upon two (or even four) sides, with large gardens meeting each other, and also with at least small side lots between them, and each standing back twelve or fifteen feet from the sidewalk, with grass and shrubbery in front, will meet all the most desirable conditions for a city residence. Such can be, at present, obtained in our large cities only by the rich. But, if common understanding or law should make it usual to lay out and build upon only such lots in all new and growing towns, except in their strictly business portions, it would not be difficult for breathing-spaces to be perpetually maintained. How beautiful an effect may result in a city from such an open plan of construction, may be seen in East Avenue, and some other streets, in Rochester, N. Y. Yet that this is only one of the necessary conditions of the salubrity of towns, is shown by the reports of mortality in that city, from preventable diseases, owing to defective drainage and sewerage.*

On the subject of tenement-houses and workingmen's homes, their situation and construction, we shall remark hereafter.

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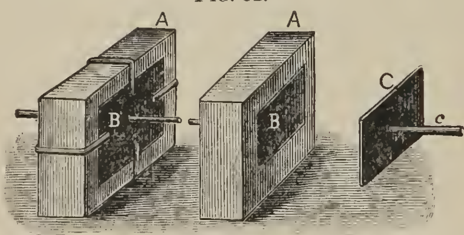
*See the Sanitarian, October, 1879, page 477.

CONSTRUCTION.

Our purpose here is not to consider the architecture of houses with regard to ornamental effect, but only the conditions requisite for healthy dwellings. Under this view, of the materials commonly employed, either wood, brick, or stone may be made to answer. A frame house allows the most air to penetrate its walls, unless they are specially protected; and, in a climate with severe winters, this is trying to delicate people. Those who begin with good health usually find an *airy* mode of living agree with them better than the pent-up atmosphere of most furnace-heated houses. Moreover, a frame house having double walls, with stone or brick foundations, good plastering, and tightly-jointed timbers, may be made as little permeable by air as it is desirable for any house to be.

Brick is porous, and allows more atmosphere and vapor to pass

Fig. 82.



through it than many people are aware of. So do sandstone, mortar, and cement. Marcker and Berthold, in Paris, lately found that these substances allow gases to pass freely through them, while granite, slate, limestone, and marble are impervious. Prof. Pettenkofer, of Munich, has exhibited this permeability very well by a simple experiment. A cylindrical piece of mortar, half lime and half sand, is covered with melted wax (making it impenetrable by air), except at the two ends. A funnel is then fixed upon each end. By blowing through one of these funnels, a candle-flame opposite the other end may be blown out. If water be drawn into the mortar by suction through the funnels, so as to fill its pores, air can no longer be blown through it. This represents the condition of damp walls of houses. Another experiment of the same observer is made with compact brown sandstone. A block of this substance (A, Fig. 82), fifteen inches long, twelve wide, and four and three-quarters thick, has on each side a depression (B, Fig. 82) one-fourth of an inch in depth. In each of these depressions is placed an iron plate (C, Fig. 82), in which is inserted an iron tube (*c*, Fig. 82).

Melted resin is then poured around the edges of the plates, and the stone is thickly covered with asphalt, so that it is made impervious, except through the tubes.

When one of these tubes is connected with a burner of a chandelier, and the gas is turned on, the pressure is sufficient to force the gas through the block of stone and the other tube, so that it can be ignited beyond the latter.

This permeability of the walls of houses, Prof. Pettenkofer believes, no doubt correctly, to be advantageous. If we were sealed up tightly, except so far as intentional openings afford access to the air, some people's fear of draughts and cold, if it did not endanger suffocation, might at least aggravate seriously the evils of defective ventilation. Here may be mentioned the unsuitableness (in a sanitary sense) of *wall-papers* in any unless the largest and best-aired apartments. Not only green wall-papers, but those of several other colors, have been shown not unfrequently to contain arsenic in sufficient quantity to produce poisonous effects upon those long confined in their rooms. Moreover, papers *absorb organic matter* in considerable amount, and they are therefore particularly objectionable in sick-rooms, and, indeed, in any chambers in which persons sleep. Whitewashed, calcimined, or painted walls are more wholesome than those covered with any kind of paper.* Even paint interferes somewhat with the permeability of walls.

Nothing is more important in the construction of a house than that its foundations shall be protected from dampness. A wet cellar is a fatal fault from the hygienic standpoint. Under-drainage may correct this when it exists. A good under-layer of concrete † will be of great service, whatever the soil on which the house is built. If it be still suspected of dampness, an asphalt flooring for the cellar may be used, supplemented, if need be, by one of zinc for the first floor over it A cheap material for making cellar floors practically water-proof is made by mixing together two parts of coal tar with one part of pitch, and adding to each bucketful three handfuls of quicklime. Eassie,‡ an excellent authority, recommends vitrified stoneware tile as furnishing the best "damp-proof course," made in thicknesses from an inch to an inch and a half, and perforated, so as to ventilate the space between the ground and the joists of the floor, and to prevent dry rot in the timbers.

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* Worst of all is the really nasty practice of covering old papers again and again with new ones, sometimes three or four times in succession. They should always be scraped off before renewal.

† A compound of broken stone, pebbles, and mortar, much used for such purposes.

‡ Sanitary Arrangements for Dwellings, London, 1874.

Dr. B. W. Richardson, of London, in his "Hygeia, a City of Health," recommends that every house should be built upon arches of solid brick-work, so as to allow air to pass freely and constantly beneath its foundations. Undoubtedly, this is a reasonable suggestion, and no more Utopian than many other of his proposals for the construction of his ideal city.

No flooring of wood, at all events, should be laid directly upon the surface of the ground, but the joists of the "ground floor" should be raised at least two or three feet by stone or brick foundations.

Double walls are better than thick walls. Even as a protection against changes of heat and cold, the layer of air between the outer and inner wall will be a slower conductor than the solid wall would be. The occasional omission of a brick near the lower part of the house, or the insertion of perforated bricks at regular intervals under the basement flooring, will allow of a movement of air through the interspaces which will contribute to dryness as well as to ventilation. The distance between the outer and inner wall may be two or three inches, the open space commencing above the foundations.

Roofing must, of all things, be made and kept tight, free from leakage. Some slope is necessary for drainage of rainfall, but it need not be great. Mansard roofs, now so common, do not seem to be attended by any inconvenience. Dr. B. W. Richardson advises that roofs shall be covered either with asphalt or flat tile; but tin, zinc, or slate, well placed and kept in repair, will do. If rain-water is to be collected for use, slate will make the best roof.

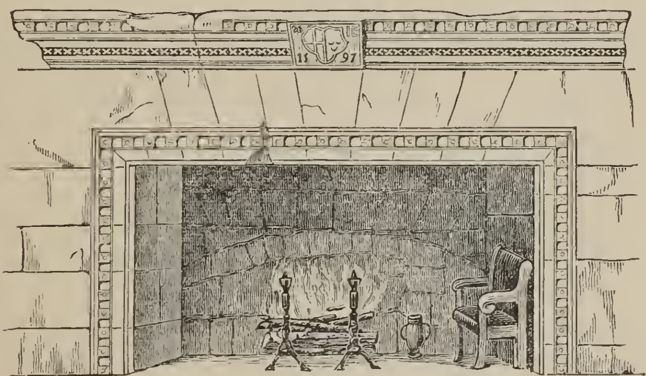
Other points in the construction of a healthy house yet remain to be mentioned. Every room for day or night use should be as large as its owner can afford, and with an abundance of windows and doors for air and light. Each room should have, if possible, at least one window on each of two of its sides. With opposite windows, a small room with a low ceiling may be well ventilated; but this involves more draught than many people wish; and a large room may always be aired with less perceptible movement of the air than a small one. Windows should be high, reaching almost to the ceiling, and opening both at the bottom and at the top, unless the casement or "folding-door" arrangement of the sash be preferred, which answers very well. Every room in the house intended to be occupied should have in it an open fireplace. This is left out, to a great disadvantage, in building a great many modern houses. Especially is it important for an open fireplace to be in every sleeping chamber. For a sick person the difference between a wood-fire on the hearth, or even a wood-burning stove, and the usual heated air, or coal-stove in the room, is immense. It may,

in critical cases, make the turning-point between death and recovery. Besides this, an open chimney without a fire is an excellent aid to ventilation. Even a stovepipe hole, left open, in a sheet-iron or other cover for the fireplace, will have a considerable influence in changing the air of a room.

All fireplaces and furnace-heaters may to advantage be placed near the centre of the house. Water-closets should be located always on the outside, so as to have a window or windows opening to the air. An extra and excellent precaution is to have a small wing or annex, expressly for water-closets, which are placed over each other on different stories; each being separated from the house by a vestibule with double doors.

Richardson, in his "Hygeia," places the kitchen in the uppermost story of the house. For this the principal argument seems to be that thus

FIG. 83.



OLD STYLE FIREPLACE.

all smells may be kept out of the house itself. A kitchen-wing, at the rear of the dwelling, may be made to answer this purpose. While coal is used for fuel, its weight will be a serious obstacle to its elevation to a third or fourth story kitchen. When gas comes to be used generally for cooking (as may shortly be the case), this objection will be removed. This is, however, rather a question of convenience than of health, as kitchen smells, when proper care is taken of refuse, are not especially injurious, although often unpleasant. If a basement, below the ground level, is used for a kitchen or otherwise, an area several feet in width should be kept around it to preserve it from dampness. Our remarks concerning drainage are reserved for another place.

What has been so far said upon the construction of houses for health has been meant to apply mainly to those whose owners can afford to

make them what they wish. But the same principles exactly apply essentially to all dwellings, from the palace of the emperor down to the hut of the laborer, or the cabin of the forest pioneer. In all, the great requisites are dryness, air, sunshine, and sufficient protection from the cold. Some of these, at least, as air and sunshine, are most readily excluded from parts of the largest houses. What experience has shown to be necessary in these, most of all when inhabited by a number of persons, may be understood by referring to some recent sanitary legislation in New York.

The new Tenement-House Act, 1879, gives the Board of Health of that city important power over these structures. The plans of all new buildings must be submitted for its approval, and it is required to secure the following conditions:

1. At the rear of every house there shall be a clear, open space of not less than ten feet.

2. No one continuous building shall occupy more than 65 per cent. of the lot.

3. The total area of window space in every room communicating with the open air shall be one-tenth of its superficial area, and the upper half shall be so made as to open full width.

4. Air-shafts must communicate with every room having neither external windows nor fireplace.

That "shutting up," even in the variable and extreme climate of the northern United States, is not, as some persons think, the great necessity for health, is amply proved by the fact that, during the Civil War, tent hospitals (*i. e.*, hospital tents) were found to give better results in the treatment of wounded and sick soldiers than the very best constructed and managed large hospital buildings. Not a few consumptives have owed the prolongation of their lives for years, and some complete recovery, to their resorting for months together to camp life in the midst of the primeval forest, where the Eden-like atmosphere, breath of the pine woods, untainted mountain water, and simple food and habits of life restore the strength exhausted by artificial living. In short, the greatest fault of the personal hygiene of our civilized habits may be summed up by saying, *we live too far from Nature.*

LIGHT.

Although we are not, like plants, absolutely dependent for our growth upon the rays of the sun, yet we share with all nature their benign influence; and if they are withdrawn constantly, health suffers. Miners, passing all their days underground, as in some of the mines of Europe, are usually short-lived and prone to diseases of debility. A physician in New Orleans, during one of its epidemic years, reported that there were more than six times as many cases of yellow fever on the shady as there were on the sunny sides of the streets; and a similar account was given of the prevalence of cholera at Buffalo, in 1849. Barracks for soldiers, so built that no sunlight enters them, have proved extremely unhealthy. For the sick, especially, who cannot leave their rooms, it is of great consequence to have the sun's rays penetrate their rooms freely a part of every day. Scarcely any exception exists to the benefit of sunshine in the sick-room, besides cases of acute inflammation of the eyes or brain. In chronic inflammation of the eyes, the practice, once common, of shutting the patient up for weeks in a dark room, has been almost entirely abandoned; it being found that the depressing effect upon the general health of the body more than counterbalances the good results in treatment of the eyes. Of all rooms in the house, the *nursery* should be the brightest and sunniest. A house is best placed so as to front north or south (preferably, in northern latitudes, the latter), in order that the rooms on each side may be shone upon during some part of the sun's course every day. If a house be built diagonally, there is an unequal distribution—some rooms are very sunny, and others never have any sunshine at all. Fronting east or west, particularly in cities the latter, will do well enough in many situations.

The ancient Romans are said to have had terraces on their houses, called *solaria*, upon which to bask in the sun and air. Sun-bathing is sometimes remedial in sickness. I have known a severe attack of neuralgia to be relieved by the patient's sitting or lying in the direct light of the sun. All convalescents from illness gain most rapidly when they can get out into the full light every day.

Dr. Arthur Downes and F. P. Blount, on the basis of experimentation, reported in a communication to the English Royal Society, assert that light prevents or retards the development of *bacteria* and of the microscopic fungi associated with putrefaction and decay. This preservative quality is most powerfully shown by the direct solar rays;

although it is possessed, in a less degree, by ordinary diffused daylight.

Yet there is such a thing, not only in the tropics, but in temperate regions, as too much sunshine. Heat-stroke, it is true, very frequently occurs in the shade, in people predisposed to it, from the oppressive effect of a heated atmosphere. But our mid-summer sun may well be tempered by the cool shade of trees not far from our dwellings. American travellers in England notice, at first with surprise, how little shaded are the rural homes, even of the wealthy, as compared with those of the United States. But a season spent under the veil of mist and cloud, which so often hides or dims the sun in that country, makes it intelligible that too little rather than too much sunshine is the danger there. No more unreasonable impost than the English *window-tax* (proportioned to the number and size of windows in dwellings) was ever invented. But we may, in America, have our houses too densely shaded. This is a not uncommon mistake. The effect of it is not only exclusion of sunlight as such, but dampness of the roof, walls, and interior of the house. While sentiment and association may plead with us to "spare that tree," whose venerable trunk and spreading branches we have loved all our lives, yet we must not allow too deep a shadow to chill the space beneath it. A safe rule is never to have trees so thick near a house that every part of it, which, from position, is accessible to the sun, may not receive its direct rays during a part of every day. We need not be forgetful of the bleaching and fading power of those rays, which lead the careful housekeeper to be afraid of them for her carpets. But, whatever compromise in the way of shades, blinds, or curtains, may be allowed, we should at least forbid, unless in the height of our American midsummer noon, the prison-like gloom of tightly closed shutters. Even after a death in a house, it is a wrong to encourage gloom and invite disease by keeping the shutters closed, as some do, for many days together. Soon after the funeral they ought to be opened again. No child can grow strong and ruddy with the bloom of health; no invalid can respond favorably to the best of tonic treatment, in a constantly darkened house. Let the sun come in!

WARMTH.

Hardly anything has changed so much with the progress of artificial living as have the modes of warming habitations. Those of the ancients whose usages are best known, the Greeks and Romans, suffered from no such extremes of climate as compel protective arrangements in northern Europe and in the United States. A wealthy Roman might warm his banqueting-hall sufficiently with a *focus* or central fire, or a *clibanium* or brazier; something like which is now, or was, not long since, used for the Pope's apartments in the Vatican. In Spain, King Alphonso was once nearly suffocated by charcoal fumes from a brazier. Anticipation of our furnace-heaters was, however, evinced in the hypocaust, with which some of the Roman emperors warmed their palaces. This was a furnace with flues to distribute heat, but without a chimney, smoke escaping by a hole in the outer wall. It was subject to leakage; one emperor, Julian, was nearly, and another, Jovian, actually, suffocated in this way. In England, during the middle ages, the fire, in the castles of noblemen, was moved to a deep recess against the wall, the smoke finding vent at a loop-hole in the roof, or by an open turret, or a louvre window at the side. Chimneys first came into use in Italy in the fourteenth century.

Fig. 84.

Water-stoves, it seems probable, were employed by the ancient Egyptians for hatching eggs; a process now common in that country. In modern Europe, they were introduced in France by the Marquis de Chavannes, during the last century. Hans Egede, a missionary writer, is said to have known of their use in a Dominican convent in Greenland, in the fourteenth century. Hot-water pipes were employed to heat a conservatory for plants by Martin Triewald, a Swede, in 1716. For dwellings, these were brought into use in England about a century later.

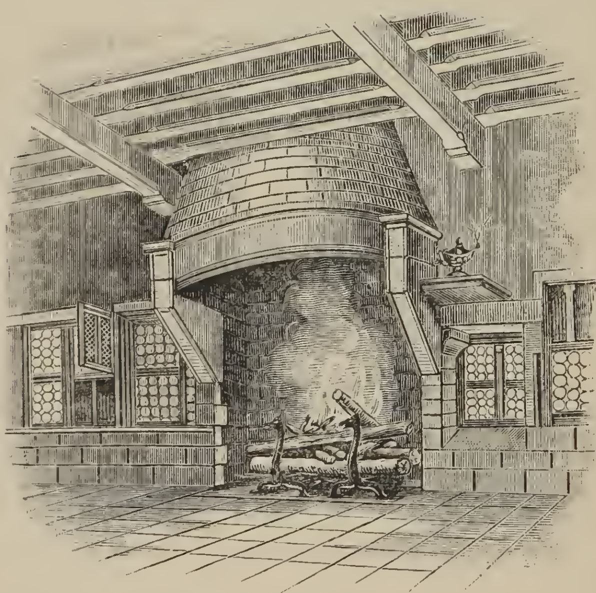
Steam apparatus for warming began as an application of the boiler of the steam-engine. Watt so warmed his office, and his partner, Boulton, extended its employment in Birmingham.

Among the first inventors of stoves, properly so called, were Cardinal Polignac, Swedenborg, the visionary philosopher, and Doctor Benjamin Franklin. The stove of the latter was an open fireplace, brought out into the middle of the room, and having a supply of fresh air from

beneath. It is approximated by the "Franklin stove" of to-day. Another celebrated American, Benjamin Thompson, Count Rumford, introduced a fireplace system which is still much approved in England.

One of the remarkable modes of warming apartments, little known in this country, is the *kakelung* of Sweden. It is described as "a great stove of masonry, covered with porcelain plates, having usually five flues, through which the gases of combustion must pass up and down, a distance of thirty to fifty, or even sixty feet, before escaping into the air." The principle of its operation is to provide enough material to absorb all the heat from the fire, the gases being conducted through the long flues until they give up all their heat. If ventilation be well supplied by other means, this arrangement must be extremely economical at least. In Germany and Russia porcelain or brick stoves of a similar kind are still used, and are extremely comfortable.

Fig. 85.



The primitive blazing wood-fire, with logs heaped in the chimney-place, has everything in its favor in regard to beauty of appearance and freshness of the air. A backwoodsman's hut, with a fire on one side or in the middle, and a door wide open, will warm at least one side of each of its inmates at a time. The other side, exposed to the outer air, may be cold, so it may be needful to turn around, like a piece of meat on the spit, before the fire. This illustrates one, and the quickest and most effec-

tive, of the different modes of receiving communicated heat, viz., by *radiation*. Nothing is equal to direct radiated heat in comfort and restorative power, when one has been chilled with winter's cold. But it is the least economical of all methods, as but little effect is felt in those parts of the room which are not in front of the fire, or nearly so. Moreover, according to the physical law of radiation, the heat diminishes in proportion to the square of the distance; so that at the distance of ten feet from the fire it is one hundred times less than at the distance of one foot.

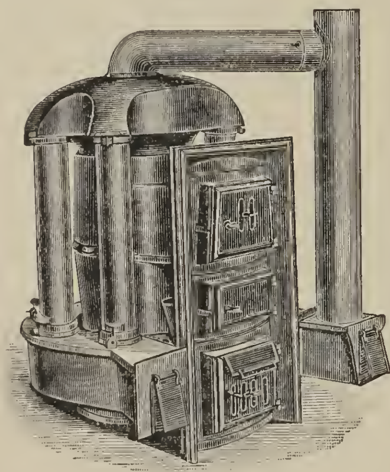
Conduction through solid bodies, a very frequent mode of distribution of heat in nature, has been made purposely available to only a small degree in warming rooms. By the walls of the house, however, heated by smoke, gas, and warm air passing up through chimneys and flues, rooms are considerably warmed. It is probable that the best way of all (scarcely anywhere as yet tried) may be hereafter found to be, to heat steadily all the floors and walls of apartments by warmed air circulating beneath and around or through them. This will give an evenly warm *climate*, so to speak, to the house; imitating the plan of Nature, according to which almost all the heat of the atmosphere of a region is given to it by the sun's rays heating the earth, which then communicates its warmth to the air. The Chinese have something like this, at least so far as providing warmth for their floors by slow fires underneath.

This last kind of conveyance of heat, by conduction, we follow, in part, in the use of stoves; which give their temperature to the air in contact with them. By expansion, warm air is made lighter, and so is displaced and forced upwards by the heavier cold air. Rising currents are thus caused, and a *circulation* of air results, as one can see by the curious undulating appearance of objects looked at over the top of a stove, as well as by the upward movement of light, floating particles above the heated surface. *Convection* is the technical term applied to this manner of diffusing heat.

When the fire by which air is warmed is in a cellar, basement, or hall, so that the warm air may be distributed, by flues and registers, into several apartments, we have the now common *furnace-heater*. It saves trouble and dirt—making one fire, out of sight, answer the purpose of as many as there are rooms to be warmed. But it is often unequal in the share of warmth given to the different apartments. If this difficulty be overcome by skilful and careful use of valves, dampers, etc., an important fact, often forgotten, remains, that while the cellar-heater furnishes warm air to *enter* the rooms, it affords, of itself, no *outlet* for its escape. There may thus be produced a pressure within a parlor or other room, so long as the doors and windows are shut, which is sometimes unpleasant and unwholesome. Again, when a door

is open, if there be no heat supplied in the entry or hall, a cold current creeps along the floor of the room, chilling the feet of those who are in it. In an apartment so warmed, there is often a difference of 12° to 20° Fahr. in temperature between the floor and the height to which a man can reach. This is the reverse of what ought to be the case; since *to keep the head cool and the feet warm* is one of the most approved maxims of health. A room is only properly warmed when there is no considerable, if any, difference by the thermometer between the floor and the height of an ordinary mantel-piece.

Fig. 86.



A FURNACE-HEATER.

What should the temperature be, say at the latter height, for health? Authors differ somewhat upon this point. A bright wood, or glowing anthracite or bituminous coal fire, will allow of a lower temperature of the air of a room than will suffice when there is no direct radiation of heat. Even the rays of the sun pass through the atmosphere without warming it, unless it contains floating vapors or solid particles. Yet we feel their warmth, often intensely, when they reach our bodies. A difference exists, moreover, according to whether we are sitting still, or moving about or working in any way. A workshop, gymnasium, or skating-rink may safely have a temperature many degrees lower than a drawing-room, sitting-room, lecture-room, or school-room. Only, when those who have been exercising actively in a cool or cold apartment sit down to rest, they are in great danger of catching cold, unless they protect themselves immediately by some increase of clothing.

For a sitting-room of any kind, my own conviction is that 70° Fahr.

at the height of a mantel-piece is the best temperature. Some writers, in England especially, have put it down at 68°, or even 65°. I believe such to be suitable only when open, radiating fires are employed. For a sick-chamber, 72° may sometimes be better, if the air can, by good ventilation, be kept fresh as well as warm. There is no necessary (although there is unhappily a frequent) connection between warmth and closeness of the atmosphere in a room. Of the harm done or endangered by overheated rooms, an account is given in another volume.*

Returning to the furnace-method of warming houses, a few conditions may be named as essential to its compatibility with health.

1. The furnace should be large in proportion to the house; so that with a moderate fire, not pushed, it may warm a sufficient supply of air to give a good temperature to the rooms depending upon it. A very hot furnace *bakes* the air, as it were, producing an unpleasant odor and an uncomfortable feeling through the house. If the furnace be too small, it will not furnish enough heat, without driving the fire hard, in cold weather.

2. Air should be supplied to the air-chamber directly *from out of doors*. A cellar atmosphere, at the best, cannot be equal in quality to the open air, and at its worst may be very bad indeed. In another place we may farther allude to its evil possibilities.

3. Water should always be placed in the air-chamber, so as to evaporate constantly, and prevent undue dryness in the air of the house.

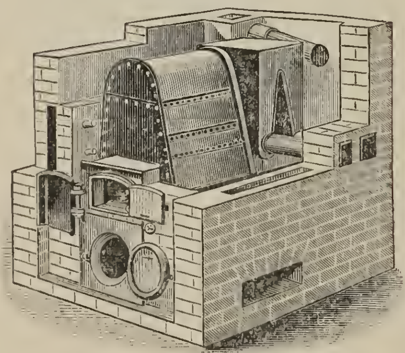
A certain amount of moisture in the atmosphere is essential to life itself. Every one is familiar with the destructive effects of the Simoom, Khamseen, and Harmattan winds of Arabia and Africa, which carry the scorching aridity of the desert with them, blasting everything that has life in their course. While excess of dampness is a very frequent promoter of disease, it is equally true that artificial heat, such as that of stoves and furnaces, tends to create the opposite extreme. Warming the air increases its capacity for retaining moisture without saturation. The term *relative humidity* is employed to indicate the condition of the air at any time and place, as compared with saturation. Calling saturation 100, for example, the relative humidity of the air may vary in our climate all the way down to 12 or less. Dr. Wetherill, some time since, found the mean of several years at Washington to be a little over 68. At Halle, Germany, Müller found the mean to be 75. In Philadelphia, in twelve years, it was 68.5. Roscoe, in the House of Lords, in London, ascertained the range of agreeable humidity to be between

* See Winter and its Dangers, by Hamilton Osgood, M. D., No. 5, of the American Health Primers.

55 and 82; the mean between which extremes is 68.5. Best of all, no doubt, for health and comfort, is from 67 to 69.

Now, by raising the temperature of the air in any apartment from 50° to 70° Fahr., its relative humidity may be reduced from 100 to 25; that is, from containing moisture enough for saturation down to one-fourth of that amount. Of course, then, there is reason for adding a sufficient quantity of vapor to bring it up to twice as much or more, say to 68. Dr. Wetherill estimated that the halls of Congress ought to have nearly eight gallons of water evaporated every hour for the proper hydration of their atmosphere. Prof. Joseph Henry, so long the admirable head of the Smithsonian Institution, introduced into its building an arrangement for adding *steam* to the air of the air-chamber of the furnace by which it is warmed.

FIG. 87.



REYNOLDS' FURNACE.—(FROM PUTNAM.)

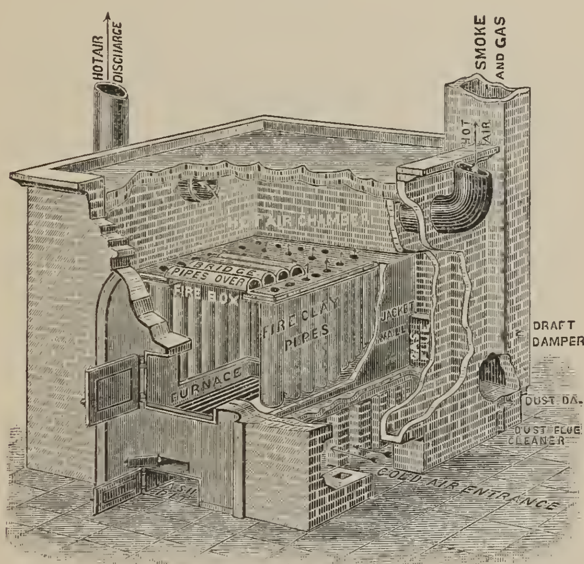
From these examples we may understand how important it must be to have an evaporator in every furnace air-chamber, and a shallow pan of water upon every stove used for warming our rooms.

On the other hand, in the absence of fires, during the spring and autumn, houses in some localities and in rainy weather may become *too damp*. It is then a wise and important precaution to light fires at such times; if the weather is not cold, opening the windows. This removal of house dampness is especially of consequence in places where *autumnal fevers* (intermittent and remittent) prevail.

4. Sedulous care must be taken that no leakage of gas occurs from any flue or pipe into the air-chamber. Coal-gas is poisonous when concentrated. Not unfrequently death has been produced by its insidious entrance into the air of occupied rooms. A telling instance was narrated, a few years ago, of what happened in a public school in one of

our cities. The lady teacher, sitting at her desk on a raised platform, observed that some of her youngest pupils were nodding, and shortly several of them fell over on the floor. Bench after bench they were overcome, when her presence of mind sufficed to get the windows open, and to have the children carried to another room, where they revived. The cause of the trouble was an obstructed and leaky stove-pipe, through which gas had been slowly escaping into the room and stealing their lives away, first acting upon the smaller scholars, breathing the air nearest to the floor. Many a time, without any such alarming immediate effects, gas from imperfect furnace flues in our city houses pro-

Fig. 88.



A RADIATOR FURNACE.

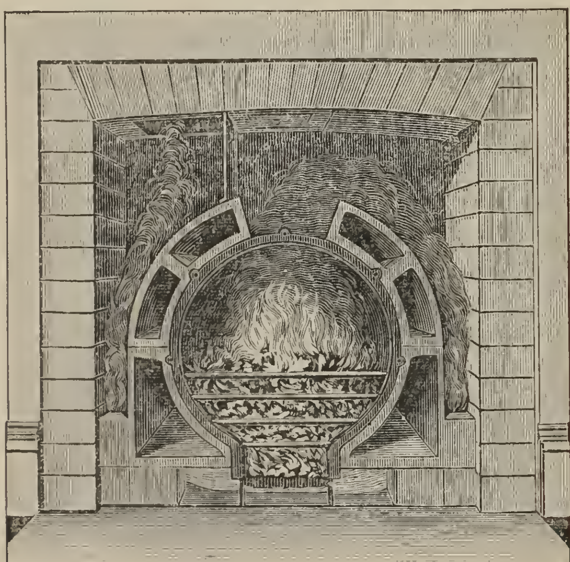
duces headaches, general discomfort, and debility, often ascribed to some other imaginary cause. It is quite necessary that the box or tube which admits air into the air-chamber shall be so tight that gas cannot be drawn into it when the upper door of the furnace is open. If the draught be imperfect, there may be, especially when fresh coal is put on, an escape of gas into the cellar. This possibility adds emphasis to the reasons for having not the cellar, but the open air, to give the supply to the air-chamber for the house.

5. Warm air should be supplied to the main hall or entry with which parlors or sitting-rooms are connected; so that the doors of the latter may be open without causing currents of cold air along the floor.

6. Since, as above said, no *outlet* belongs to the warm-air system of itself, the needful air-movement must be maintained by some method of ventilation. Barker's arrangement of flues and registers for introduction and exit of air, so as to warm and ventilate at the same time, will be referred to on another page, under the head of Ventilation. Open doors, at all events, into the entry or hall, or open window cracks, must be insisted on if nothing better can be obtained. Best of all, however, it will be to combine the two modes of warming, by having an open fire, for instance a "low-down" grate, in one part of a large room, or in one of two communicating rooms.

The open fire gives the glowing, comforting, radiant heat, and sup-

Fig. 89.



plies ventilation by its upward draught into the chimney; while the air from the furnace air-chamber, if properly arranged, makes sure the diffusion of an equable and sufficient warmth through the house. Open-grate fires, burning either bituminous or anthracite coal or coke, are cheerful, and give out a great deal of heat. When the air for their draught is supplied from out of doors, entering from the back or below, fire-ward currents along the floor are not produced. What is called, in England, the Galton system, has been found to work well also in this country—having fresh air introduced through a grating at the back into an air-chamber, and thence into the apartment above (or at the sides of) the fireplace. There is thus obtained a considerable economy of fuel.

Ventilating stoves, upon a similar principle, are also employed. Among the arrangements which appear to have succeeded is the Ruttan "Air-Warmer;" and the editor of the *Popular Science Monthly* * speaks in praise of what is called the "fire on the hearth."

Objectionable, beyond other means of warming living-rooms, is the "air-tight" coal-stove. Yet, from their economy and convenience, stoves more or less nearly air-tight are very largely employed. If air is introduced into the room in good amount, and water is kept constantly evaporating upon the stove, an ordinary stove can be managed without necessary injury to health.

Cast-iron stoves are somewhat more permeable to gas than those made of wrought- or sheet-iron. Careful experimentation has shown, however, that no appreciable penetration of the metal (in the absence of cracks allowing leakage) by carbonic oxide or other gases takes place, unless at, or near, a red heat. According to chemical authorities, cast-iron contains in itself more or less carbon, sulphur, phosphorus, and sometimes even arsenic, products of whose combustion may be given out at a very high temperature. No stove ought ever to be heated red hot in an occupied room. A stove large for the apartment is always the best, on account of its giving off sufficient heat with a moderate fire, instead of needing, from deficient size, to be constantly urged to a high heat.

In the homes of the poor, in large cities, from want of means to rent more than one, two, or three rooms for a family, a great evil in mid-summer is, sometimes, the excessive heat of the cooking-stove. Near this, in a small room, often in a narrow, crowded court, the mother is obliged to lay her babe, and to watch the older children, while she cooks their meals or heats water to wash their clothing. No wonder that the "summer-complaint" attacks infants in such places; and no wonder that, when they are so attacked, medical skill often fails to bring relief, unless the little sufferers can be taken away to the open hill-sides of the country, or to the sea-shore. What a blessing of blessings to these is the sea-side "sanitarium" or the "country week!"

Large houses, even private dwellings, are not unfrequently warmed by pipes containing hot water or steam. Theoretically, hot water ought to be the best, from the hygienic standpoint; because the temperature produced by it, under ordinary pressure, is never very excessive, as that of steam may be.† Still, the positive and comparative usefulness,

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* November, 1879.

† It is a singular mistake made by some persons to suppose that the heat furnished by steam- or hot-water pipes is *moist.* As the pipes are always (if rightly made) entirely tight, water for evaporation is needed just as much with them as with ordinary warm-air furnaces.

and general advantages of both methods depend very much on the skill and care with which the apparatus is constructed and managed. It has happened to me to become well acquainted, during two years, with the disadvantages of an ill-constructed apparatus for steam-heat. Yet in many buildings it appears to give fair satisfaction.

It is of consequence to remember, at all events, that all pipe systems, yet more than warm-air furnaces, are absolutely without any arrangements for ventilation, which must therefore be otherwise supplied. Many authorities agree in recommending that, instead of having coils or lines of pipe as "radiators" in the different rooms to be warmed, the heat of pipes should be utilized by means of air-chambers, through which fresh air is passed in contact with them, and, after being warmed, is distributed through the house by means of flues.

Warming, as well as cooking, by means of gas, seems not unlikely to become common in our houses. It offers extreme convenience as its great attraction. Many years ago I proposed, in a communication to the Franklin Institute, warming and cooking by means of pure hydrogen gas, conveyed through pipes separate from those of the gas used for illumination. It has the advantage of giving off much heat in proportion to its volume, and, what is more important, the product of its combustion is simple water; while ordinary burning gas produces also carbonic acid, carbonic oxide, and sulphurous acid, besides other deleterious substances contained in it before burning, which may escape through leakage. My proposition was set aside at the time on account of the expense of the manufacture of hydrogen compared with the cost of coal as fuel. Should coal become much more dear, or a very cheap process for making pure hydrogen be invented, the hydrogen stove may perhaps yet come into use. When common gas is burned, unless a special arrangement is made to carry away the results of its combustion, it vitiates the air considerably. A gas-stove needs a chimney, or at least an escape-pipe communicating with one, as truly, and for the same reason, as does a kitchen range or other stove.

It is, however, more easy to provide this in connection with a gas fire, on account of its being less bulky than one of coal; and the gas-burner's escape-tube or pipe may be made an excellent means of ventilation. Eassie* describes a plan for a gas-stove, in which fresh air is introduced by a pipe from the exterior into a cylinder which surrounds the burner, the latter being enclosed in, and receiving air through, a tube communicating with the outer atmosphere, the results of the combustion of the gas being carried off by the tube passing out

* In his work on Sanitary Arrangements, etc., before mentioned.

above the stove. Thus there is no possibility of the air of the apartment being contaminated, and a good ventilation, as well as warming, is obtained.

The necessity of removing the products of the combustion of gas, as well as those from that of candles or oil, is very pressing. Prof. Pettenkofer ascertained that a man exhales every hour from six- to seven-tenths of a cubic foot of carbonic acid gas; saturation of the air of an apartment with which gas is fatal, and even four per cent. of it is dangerous to life. Angus Smith and Hartley assert that a good oil "moderator" lamp produces a little more than half a cubic foot, and a good candle three-tenths of a cubic foot of carbonic acid gas in an hour.

A common gas-burner, consuming three cubic feet of gas per hour, gives off about as much carbonic acid gas as three men would do in the same time.* Of course the larger size of the burners employed for warming or cooking purposes than for illumination must involve occasion for a proportionately increased supply of air in ventilation. Of this, however, we shall speak presently.

* Lange's estimate is that a gas-burner giving a light equal to that of eight candles, produces nearly as much carbonic acid as six men.

VENTILATION.

Ancient Egypt, the site of the earliest civilization whose remains have been spared by time, appears to have been somewhat acquainted with the needs of ventilation. In the Pyramid of Cheops, probably older than Abraham, a passage exists, seeming to have had the purpose of conveying air into and out from the chamber in the interior of the structure. Acron, a Greek philosopher and physician, in the century before Hippocrates, is said to have arrested an epidemic at Athens by lighting fires in several places in the city to change the air. Celsus, the great Roman physician, alludes in his writings to the beneficial action of fire, the sun's heat, and elevated exposure, in purifying the air of sick-rooms. The ancient Romans sometimes employed great bellows for ventilation. In Germany, in the sixteenth century, bellows and also rotary fans were used to inject fresh air into, and force foul air out of, mines. Desaguliers imitated this in England in the eighteenth century; and also contrived a revolving fan to ventilate the House of Commons by drawing foul air out at the top of the building. This arrangement was in use for nearly eighty-four years. Dr. Hale, of London, during the same century, invented what he called "ships' lungs," for airing, by a kind of bellows, the holds and other parts of vessels at sea. Sutton, a London brewer, near the same time, attained a similar result by utilizing the cooking-fire on the ship's deck. Hospital ventilation, through aspiration by heated flues, was introduced into England by Sir George Paul, in 1820. Dr. Arnott, a little later, did a great deal to stimulate attention in Great Britain to ventilation. His chimney-place valve is still a good deal used. A curious but sensible proposal, made by Sir Humphrey Davy for the House of Lords, and afterwards carried out by Dr. Reid, was to make a great number of "gimlet-hole" apertures for the removal of foul air.

No educated person denies the importance of ventilation; but scarcely one in a hundred of the best-educated people gives enough practical attention to it. It is proper, in this place, to go down to the elements of the subject. Why do we need to "ventilate" at all? Because we have to breathe; and in breathing we use up and spoil the air. Everybody knows what happens in drowning; air is, for a minute or two, kept out from the lungs by water, and the submerged person dies. So when a man goes into a beer-vat, lately emptied of its liquid, but leaving some of the gas of fermentation, carbonic acid, behind, he falls

over, and, unless at once rescued, loses his life. Sleeping in a room in which charcoal is burning, away from an open chimney, has likewise often been fatal. In these cases, it may be said, the air is poisoned. This is true; but it is not more certainly, nor even so badly poisoned, as it is by human breaths and the exhalations of our bodies. Charcoal gas is carbonic acid; we exhale that, and besides, with every breath, and from all the pores of the surface of the body, *deleterious organic matter.* This combination, when concentrated, will kill more quickly than the gas produced by simple combustion alone. In the famous instance of the "Black Hole of Calcutta," always cited in connection with this subject, one of the survivors of the night-long imprisonment (of one hundred and forty-six men in a room eighteen feet square) mentions, that although the room had in it two small windows, all but twenty-three men died; several of them with different symptoms from those produced by breathing carbonic-acid gas alone. Another example of the same thing is the following: A steamer (the Londonderry) was overtaken in the Irish Sea by a storm. The passengers, about two hundred, having been ordered below, the captain, to prevent water from getting in, battened down the hatches. Before their suffering and alarm compelled him to set them at liberty, seventy-two had died of suffocation. There is, then, *immediate* danger from want of ventilation. But this is far from all. An impure air may poison us slowly. Typhus fever (jail fever, camp fever, ship fever, of different places) may, I am well convinced, be engendered by this cause alone, as well as by contagion. Typhoid fever and diphtheria are, at least, much promoted by it; and, without any such diseases, a low state of health, with increased liability to scarlet-fever, measles, etc., and a greater probability of death when they occur, is a constant effect of close living. Pulmonary consumption and other affections of the chest, as pneumonia and bronchitis, are much more common and more fatal with those who live all the time in ill-ventilated rooms than in those who, with an active, out-of-doors life, are exposed to the vicissitudes and inclemencies of the weather. This is a fact which, if it were generally appreciated, might make a great difference in the manner of living of many people.

Air consists chiefly of two gases mixed together. Referring to larger works for more precise details, we may say that these are about four-fifths of nitrogen and one-fifth oxygen. The latter is the vitalizing, indispensable principle; the nitrogen merely dilutes it. Also, the air contains a variable amount of watery vapor, which we cannot do without, but which may be more or less disadvantageous by excess; a quantity of carbonic acid, averaging, in the open air, three or four parts only

in 10,000; and other ingredients,* gaseous, vaporous, and even solid (dust, etc.), present or absent, according to locality and circumstances. Of these *non-essentials* of the atmosphere, the organic matter derived from human beings, other animals, and plants, living or dead, is the most important, because capable of doing the most harm by its decomposition and poisonous action.

A man, by his breath, will spoil, in twenty-four hours, about three hundred and fifty cubic feet of air; as much, that is, as would be contained in a room a little more than seven feet square, with a ceiling seven feet high. Could all the carbonic-acid gas exhaled by a man in that number of hours be collected, and its carbon extracted from it, the latter would be equal to half a pound or more of charcoal, besides the organic matter given off, whose amount is not easily estimated.

When people sleep in small rooms with closed windows and doors, or collect in numbers in church congregations, theatres, etc., with lights burning, and, in cold weather, with windows and doors shut to keep up warmth, foulness of the air is soon produced. Of this, an excess of carbonic acid is a part, and a sign of other impurity. If air contains more than six or seven parts of carbonic acid in 10,000, it must be counted impure. Yet the following are amounts of that gas actually found by examination in certain localities:

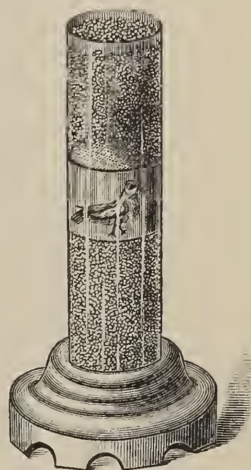
	Parts in 10,000.
London school-room (Roscoe)	29.
Munich school-room (Pettenkofer)	72.
Munich beer-saloon (Pettenkofer)	49.
Hospital, Madrid (Luna)	43.
Bedroom, Madrid (Luna)	48.
Lecture-room, Paris (Leblanc)	67.

Diminution of the oxygen of the air occurs, also, from breathing and burning of fires and lights. If this goes so far as a loss of two or three parts of oxygen in a hundred, life is endangered from this cause, as well as from the negative or obstructive effect of excess of carbonic-acid gas. This latter gas, when pure, cannot be breathed into the lungs; but, when dilute, it enters them, and produces unconsciousness and death, more or less rapidly according to its amount. Where a lighted candle goes out, as in a beer-vat or an old dry well, or unventilated coal-mine, etc., it is known to be unsafe for a human being to go. Four per cent. of carbonic acid renders the air dangerous to life; ten per cent. will overcome any one almost immediately.

* *Ozone* is oxygen gas in a peculiar state of concentration. There is but little of it present in the air of densely inhabited places; more in the open country and near or upon the sea. There is reason to believe that it is more stimulating than oxygen in its ordinary condition in the air.

Considering, then, the propensity of many people for shutting everything up, the porosity of our walls, and the unintended cracks in doors and windows of most houses, must be regarded as fortunate and preservative. A movement of the air goes on by *diffusion*, as well as by the winds and currents perceived by our senses. Pettenkofer devised a curious experiment to show how air penetrates through gravel. He half filled a glass cylinder with gravel, over which a wire netting was placed; on this a canary bird was put; over him another wire netting, and above that the cylinder was filled to the top with gravel. So the bird lives all day, without seeming to be incommoded for want of air. The warmth of its body induces a gentle ascending and descending current of air around it through the two layers of gravel, the upper one communicating with the atmosphere. Without such a movement to renew the air for it to breathe, it would be fatally poisoned in a very few hours. Although birds consume and require more air in proportion to their bulk than we do, yet our larger size involves a demand for atmospheric movement much greater than, without investigation, most people would suppose.

Fig. 90.



This demand is too often very imperfectly met. Look, for example, at the following figures, taken from good authorities. First, we must premise that, as an adult consumes three hundred and fifty cubic feet of air in respiration in twenty-four hours, *at least twice* that amount of space *ought* to be allotted to every person in a living apartment, whether awake or asleep. In a hospital, it ought not to be less than 1000 cubic feet for each patient.

	Cubic feet per head allowed by regulation.
English Poor-Law Board, dormitories	300.
London Metropolitan Lodging-Houses	240.
London School Board, per scholar	130.
English Wooden Hut Barracks	400.
Prussian Barracks	495.
English Wooden Barrack Hospitals	600.

But cubic space does not settle the whole question at all. Granting to each person in an unoccupied room 1000 cubic feet, the air in that space ought, for health, to be *all changed about four times in an hour.* Let us contrast, with the table above given, another, slightly modified

from one calculated by Morin, an eminent French sanitarian.* It states the requirements which are now considered not too great, indeed quite moderate, for health:

	Air per head, per hour, cubic feet.
Hospitals for ordinary patients	2000 to 2500.
Hospitals for wounded or lying-in	3500.
Hospitals for epidemics	5000.
Workshops	2000 to 3500.
Public assembly rooms	2000.
School-rooms	1000.

But, say some of our readers, this is alarming. How can any ordinary house be provided with such a movement of air? It is, in fact, an easier matter than would at first thought be supposed. A good ordinary fire will cause from 6000 to 10,000 cubic feet of air per hour to enter and leave a room.† How are the winds caused, which sweep over everything on the surface of our earth? By differences of temperature, making the air heavier and lighter in different localities; the colder and heavier air moving so as to displace upwards the lighter warm air, and thus making currents in the atmosphere. The same cause is constantly acting in our houses, more or less powerfully. But it needs arrangement and encouragement to give it full effect.

Before saying more about this, it will be well to dwell upon another very important fact in Nature. It is remarkable that the proportion of the two gases, oxygen and nitrogen, of which the air is chiefly composed, is almost exactly the same everywhere, although they are only mixed, not chemically combined. From the "difficult air of the iced mountain top" to that which is filled with spray by the breakers at the margin of the sea, the same air is breathed by all, except where it is spoiled in or near human habitations or other artificial constructions. The "law," or general fact, of which this is an example, is the law of the mutual diffusion of gases. Every gas tends to expand and occupy all the space to which it has access; and different gases do not interfere with each other's liberty in this respect. Carbonic-acid gas is so heavy that, when quite pure, it can be poured like water, from vessel to vessel; and yet, if a vessel of it is left open to the air, it will soon pass off and disappear. This is very important to us, as, otherwise, the amount of this heavy gas produced by all the respiration of men and animals, and the combustion of fuel, in our cities, would make the continuance of life impossible.‡

* For the exact table, see Buck's Hygiene and Public Health. New York, 1879. Vol. I., p. 705.

† Healthy Houses, by F. Jenkins, F. R. S.

‡ A beneficent aid in the removal of carbonic acid from the air is provided by the

This constant diffusion of air-constituents is not fully appreciated by all, even of those who have given attention to sanitary science. Some writers upon hospitals assert that the ceiling of a ward may be too high for good ventilation. I am sure this is a mistake. Familiarity with hospitals for several years, and comparison of them by visitation in Europe as well as in this country, besides what every traveller knows of the great cathedrals abroad, has confirmed to my judgment practically what should be expected according to theory, namely, that *the ceiling of no living-room, for the sick or the well, can be too high* for health. Of course, it requires more consumption of fuel to warm sufficiently a room with a high ceiling than one with a low one; but this is an economical rather than a sanitary question.

It is a maxim of pre-eminent importance, in regard both to breathing air and drinking water when exposed to causes of contamination, that *confinement and concentration intensify, while dilution and diffusion make innocent, most organic poisons.* To put the case strongly, I would rather, with a view to the safety of health, have a water-closet ventilated, even through a house by open doors and windows communicating with it, than have it not ventilated at all, while used constantly. Indeed, the most terribly killing of all poisons of the kind now referred to is produced by shutting up old cesspools. Take, for example, such a case as this:

Not very long since, at Cleveland, Ohio, four deaths were caused by opening a cesspool, which had not been used for a number of months, and had been covered with planking, over which were eight inches of dirt. One of the men descended, in order to open it, into an adjoining privy vault, which was in use and ventilated. As soon as he made a communication with the cesspool, so as to allow its gas to escape, he fell over unconscious. Three others, who entered after him, experienced the same fate, and all died.* The question of drainage and "conservancy" will be considered later in this book; but I wish to place here large emphasis upon this most vital difference between *concentrated* and *diffused* organic poisons of air or water.

It would be easy to bring together many instances of different kinds to illustrate the close relation of air-space and ventilation to health. I will here add but two, which are rather curious. The proprietor of a large factory in Manchester, England, having a working-room too small for those engaged in it, and not well ventilated, enlarged it. He was,

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action of the leaves of trees and other plants, which, during the daytime, absorb this gas and give out oxygen in return. But this would not suffice without diffusion.

* Report of Health Department, Cleveland, Ohio.

soon after, obliged to increase the wages of his employees, because, with better air to breathe, their appetites became larger, and it cost them a good deal more to live. A dining-club, in Edinburgh, concluded that the ceiling of their dining-room was too low. They had it raised, and, in consequence, the amount of viands consumed at their prandial gatherings was found to be notably and expensively increased.

Yet, to show how singularly such simple sanitary principles may be misapprehended, a printed circular was distributed in Philadelphia by its Board of Health, in 1866, prior to an expected visitation of cholera, in which the families of the city were advised to shut up all their windows at four o'clock every afternoon, and keep them closed until ten o'clock the next morning! This august body has, undoubtedly, gained in wisdom by a dozen years of experience, or, with such ideas, it would not be a very safe guardian of the public welfare.

We may see, from what has been said, how obvious and simple are the objects to be aimed at in ventilation, however complicated and difficult sometimes may be their attainment from the interference of circumstances. These objects are:

1. To move uniformly through a building the required amount of pure, fresh air.
2. Duly to distribute this air to the different apartments in the house.
3. Properly to diffuse it in each room.
4. To remove the vitiated air from every room in the building.
5. To warm the air sufficiently in winter.
6. To supply it with an appropriate amount of moisture.

Most of the year, and for the majority of persons, it is necessary that the movement of the air through apartments in which they live should be gentle as well as uniform. That is, we must avoid draughts, unless in the warmest and driest of summer weather, when we court every breath of a zephyr, whose comings are " few and far between." * Yet there must be a *movement through* every room, not merely one opening into it; outlets as well as inlets must be provided.† A chamber with but one window, with the door shut, and without either an open transom or a fireplace, is often insufficiently ventilated, except in windy weather. The best chance for such a room is to have the window open both at the top and at the bottom. The cold air will then enter below

* At 60° Fahr., air-movement is not felt as a draught unless it has a velocity of $2\frac{1}{2}$ feet in a second.

† In a private conservatory at Germantown, Philadelphia, every plant was killed in a single cold night, because, through oversight, although a warm-air flue opened into it, *no outlet* was left for the maintenance of air-movement through it.

(being heavier), and the lighter warm air will escape at the upper opening. In order to get the most uniform air-movement through a room with the least draught, several inlets and outlets are always better than one or two. If there be two or more windows in a room, it is best to open *each a little*, both at the bottom and at the top. Thus the total of inlets and outlets may be greater than would be borne if a single window afforded it all, either at the top or at the bottom. It is wonderful *how small* the cracks may be which several windows will need to have as openings, in order to keep the atmosphere of a room sweet and pure.

Natural and *artificial* ventilation are often spoken of as two different and contrasted things. But since all human constructions, houses

Fig. 91.

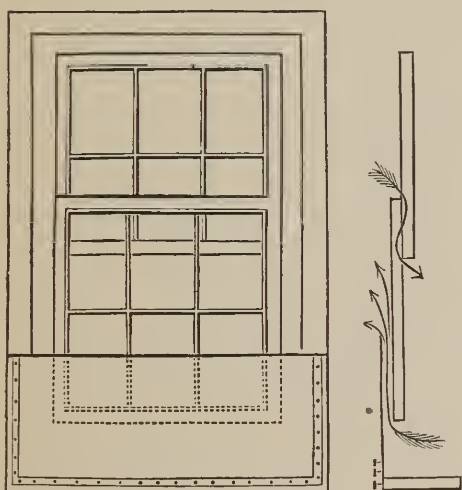
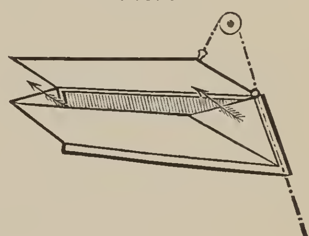


Fig. 92.



included, are artificial, *spontaneous* or *accidental* would be a better term than natural. The other term, artificial, may as well be retained; meaning the use of apparatus or special arrangements expressly for ventilation. By spontaneous or accidental ventilation, then, we mean, that of open fireplaces, doors, and windows. Of the fireplace, so serviceable even without a fire, a good deal has been said already. Windows and doors answer very well in a warm climate and in fair weather; but they are uncertain and variable, and so liable to excess of draught, as to induce with many persons a constant dread of catching cold. Yet they may be managed, with care, so as to maintain a pure atmosphere within doors, even in mid-winter, so long as sufficient heat is afforded by warming-apparatus, for comfort and health. They answer best, perhaps, with open fires. Many English

sanitarians prefer "natural" ventilation to any other kind, for dwellings and hospitals. Among these, Florence Nightingale, one of the highest recent authorities on hospitals, exclaims against the "abominable artificial ventilation" of some European institutions.

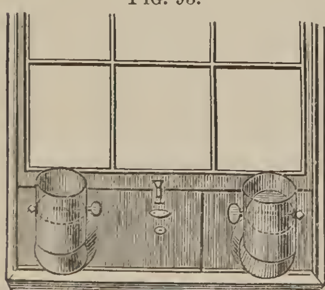
Next to the purely spontaneous or accidental methods come those which, in a simple manner, add to or modify these. One such is the plan ascribed to Hinkes-Bird, which is described and figured in Dr. H. Osgood's "Winter and its Dangers." It consists in the insertion of a piece of wood, made to fit under the lower sash of the window, raised a few inches. Air then enters upwards, between the two sashes, at their place of junction. Still simpler, and equally effectual, is Dr. W. W. Keen's arrangement—placing, with tacks or pins (preferably the former, using loops of tape, which can be taken off and replaced, as wanted), a piece of cloth or paper across the lower ten or twelve inches of the window frame, and then raising the lower sash more or less, according to the weather.

Still another way of getting an upward-directed draught is by means of the Sherringham valve. For this, an opening is made through the wall, near the ceiling; and inside the room is a small shoot, or sloping board, closed in at the sides. A lid or valve, above this, may be used to lift or close, so as to regulate the amount of air admitted.

The same effect, however, almost exactly, can be obtained by fixing an upward-sloping board about six or eight inches below the top of the window, and then letting down the upper sash a few inches.

An excellent method was in use, some years ago, in the temporary building occupied by the Episcopal Hospital of Philadelphia. A pane was removed from each of the windows in a ward, and in its place was introduced a piece of zinc perforated with a number of small holes. Wire gauze will do about as well. This allows the air to come in slowly, without draught; and, moreover, it *tempers* it by the conducting power of the metal, warmed by the heat of the room. The principle here is the same, essentially, as that of the Davy safety-lamp for miners; viz., the rapid effect of short metallic tubes, or pores, communicating their own temperature to gas or air passing through them.

Fig. 93.



Nothing has pleased me more, after actual trial for a considerable time, than Maine's elbow-tube ventilator. This consists of a board (made in two parts, sliding on each other, so as to be adjusted to different windows), to be placed under a raised sash, as in Hinkes-

Bird's plan, but having passed through it two pipes or tubes, about six inches in diameter, each bent upward in an elbow; the top of each tube being open above, and supplied with a regulating valve.

By means of this arrangement, the cool air from out of doors is directed upwards altogether, and is not felt as a draught, even by those who sit quite near to the open ends of the tubes.

Inlets and outlets are both, as already said, necessary for due circulation of the air.* When they are made expressly for ventilation, the question occurs, Where shall they be? An opening in the wall, ceiling, or floor of a room may be either an inlet or an outlet, or both, according to circumstances. If it be connected with a flue from the air-chamber of a furnace, it will, of course, be ordinarily an inlet for warm air. If it communicate directly with the open air, it may be either an outlet for warm air or an inlet for cold air. When there is an open fireplace in the room, it will generally be a cold-air inlet. In the absence of a fireplace, if there be a single opening only, besides the warm-air register,—this opening will usually be an outlet, relieving the pressure caused by the furnace air-chamber flue.

A fireplace with a wide-throated chimney, and either a coal-grate or a wood fire burning in it, seldom needs any inlets or outlets for ventilation besides the cracks which, unintentionally, exist in windows and doorways. The chief problem concerns rooms warmed by heated air, or by steam or hot-water pipes. First, then, as to the warm-air arrangement. Several possibilities may be considered. Our diagrams may facilitate the comparison of them together.

In Fig. 94, warm air is represented as entering at I, near the floor, on one side of the room, and escaping immediately above this, near the ceiling, on the same side. A great waste of heat must result, with, no doubt, some, but far from perfect, ventilation.

Fig. 95 shows what will happen if warm air is admitted at the top of the room on one side, and allowed to escape, also, near the ceiling on the opposite side. Being lighter than the cold air of the room, the warm air will float over it, like oil over water, without affecting the room sensibly.

In Fig. 96, we have the inlet at the middle of the floor, and an out-

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* Dr. Parkes, in his Treatise on Practical Hygiene, says, that in a hospital the sum of inlets and outlets should be not less than forty-eight square inches for each patient. Morin advises that the fresh-air inlet should equal fourteen square inches for every one hundred cubic feet of space. Whether inlets or outlets should be largest, sanitary authorities are not agreed. I am tempted to coin the word *throughlet* for an opening which may allow air either to enter or leave the room by it, according to the circumstances of temperature, pressure, etc.

FIG. 94.

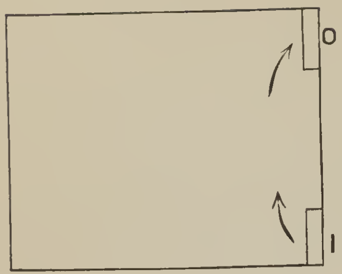


FIG. 95.

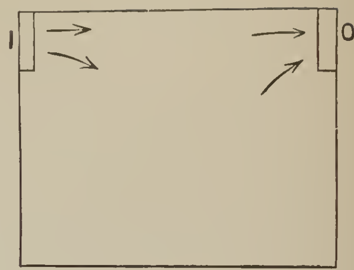


FIG. 96.

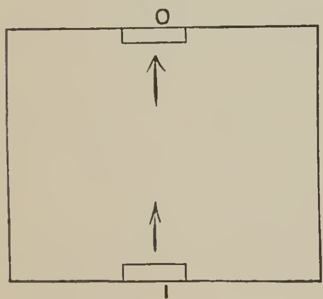


FIG. 97.

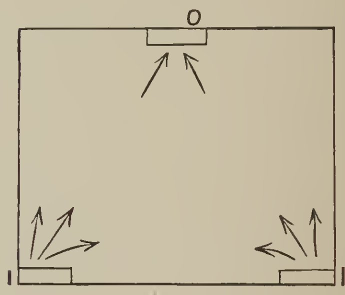


FIG. 98.

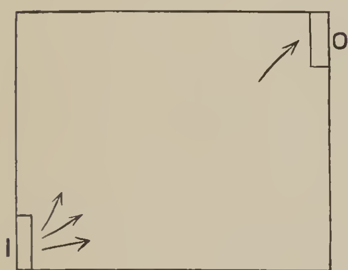


FIG. 99.

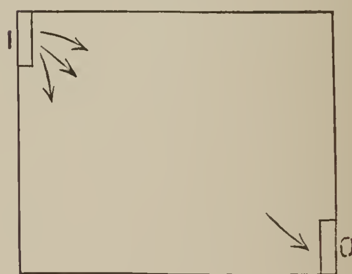


FIG. 100.

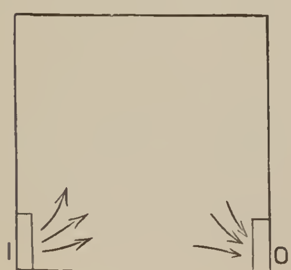
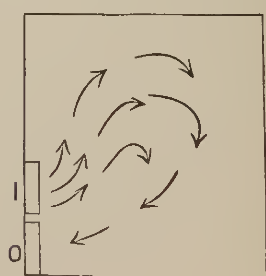


FIG. 101.

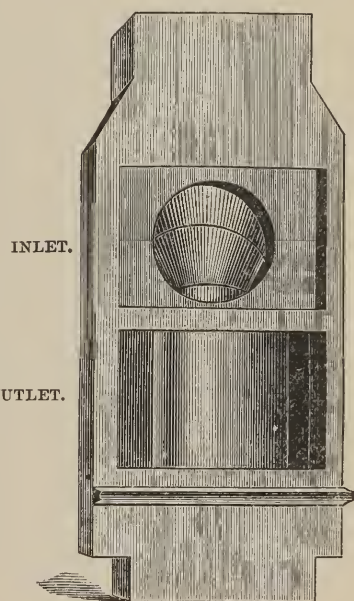


let directly over this (above a gas chandelier, for example), in the midst of the ceiling. This will ventilate, but with too much loss of heat. Better, decidedly, indeed quite good, will be the arrangement shown in Fig. 97, in which two warm-air registers are placed, one on each side of the room, at the floor, the outlet being at the centre of the ceiling.

Fig. 98 illustrates the air-movement when the warm-air flue opens at the floor on one side, and the outlet is at the ceiling on the opposite side. This will give a good distribution of the air introduced before its escape through the outlet. In Fig. 99 this arrangement is reversed, warm air coming in at the ceiling on one side and going (or intended to go) out at the floor on the other side.

In Fig. 100 the inlet is at the floor on one side, and the outlet also at the floor on the opposite side. For this plan, or that of Fig. 99, to succeed well, there must be a *compulsory out-draught* to compel the warm air to descend from the ceiling to the floor, and escape at the outlet. This compulsory draught can be afforded in two ways: by an upward current determined by heat, or by mechanical aspiration; that is, the use of an exhausting pump or fan.

Fig. 102.



Figs. 101 and 102 are designed to represent the principle of G. R. Barker's warming and ventilating flue. In it the warm air is introduced through a cowl-shaped inlet or register, elevated about a foot above the floor, while immediately beneath it is the outlet register, whose upward current is caused by the warmth of the metallic pipe through which the warm air is brought up from the air-chamber of the furnace in the cellar. Above this pipe and its cowl-like cover or top, and at its sides, the flue is open to the chimney. The course of air-movement, then, is this: warm air, entering by the upper register, rises on account of its comparative lightness, and is distributed through the room; descending as it cools, it finds its way gradually to the floor, and then is drawn out by the lower register, where, being warmed by the exterior of the air-chamber pipe, it ascends to the chimney and passes out. This arrangement for warming and ventilation has been introduced successfully into the hospital of the University of Pennsylvania, in West

Philadelphia. It appears to me the best, as it is one of the simplest, methods of ventilating apartments warmed by a furnace-heater.

Where an out-draught can be conveniently secured at an outlet near the floor, as in Fig. 100, the warm air entering on the opposite side of the room, also near the floor, an excellent effect is produced. But without such a provision for an upward current beyond the outlet (as by a pipe passing up through a chimney heated by a kitchen or other fire), cold air would often enter instead, and the ventilation would be uncertain and imperfect.

For private houses, simplicity and convenience will usually decide in favor of an arrangement such as is represented above in Figs. 97 and 98; the latter, particularly, in rooms not very large, where a warm-air register, at the floor on one side, or at one end of the apartment, and a ventilating outlet, near the ceiling, on the other side, or at the other end, will give a very good distribution of air. When the door of the room is open, instead of warmed air escaping, cold air may enter the room at the opening near the ceiling; but that, if moderate in amount, is not objectionable; as a *circulation of air*, with sufficient warmth, is what is always wanted in ventilation.

How much air can be safely admitted into a sleeping- or living-room, is a common question. Rather, it should be considered, how *rapidly* air can be admitted, without injury or risk, and at *how low a temperature*. We cannot have too much fresh air, so long as we are warm enough, and are not exposed to draughts. What is a draught? It is a swift current of air, at a temperature lower than the body, which robs either the whole body, or an exposed part, of its heat, so rapidly as to disturb the equilibrium of our circulation, and give us cold. Young and healthy persons can habituate themselves to sleeping in even a strong draught, as from an open window, if they cover themselves in cold weather with an abundance of bed-clothes. But those who have been long accustomed to being sheltered from the outer air by sleeping in warmed and nearly or quite shut-up rooms, are too susceptible to cold to bear a direct draught of cold air. Persons over seventy years of age, moreover, with lower vitality than in their youth, will not bear a low temperature, even in the air they breathe. Like hot-house plants, they may be killed by a winter-night's chill, and must be protected by warmth at all times. As a rule, we may say that, except for the most robust, the air which enters at night into a sleeping-chamber should, in cold weather, be admitted gradually only, by cracks or moderate openings; or should have its force broken by some interposed obstacle, as a curtain, etc., to avert its blowing immediately upon a sleeper in his bed. The ancient fashion, however, of having *bed-curtains*, which exclude

almost all the air, has rightly become almost obsolete. No wonder that people dream horrid dreams, and wake in the morning wearied rather than refreshed, when they sleep in rooms sealed up tightly on every side; breathing over and over again their own breaths, which grow more poisonous with every hour of the night.

Many different systems and apparatus for ventilation of rooms and houses have been invented, more or less ingenious and successful in attaining their end—Muir's, McKinnell's, Tobin's, Ruttan's, Hulin's, and a host of others. For these we must refer the reader to larger treatises. Our aim has been to set forth, as simply as possible, principles which may be applied and adapted to various circumstances. As already said, those who use open fires instead of stoves, furnace-heaters, steam or hot-water pipes, may be congratulated as not requiring, usually, any special arrangements to supplement the action of their own chimney-places. If, as some estimate, so much as nine-tenths of the heat of an open-grate fire goes up the chimney and is lost, it is, at least, not wasted, since it does excellent work in providing what every one needs, but almost no one values aright—good ventilation.

Almost everybody knows how dangerous it is to breathe the gas from burning charcoal (carbonic-acid gas), that from a common coal-fire, or the gas burned to give light in houses and streets. Charcoal gas has no smell. That from a coal-fire has smell enough to give warning, if it is noticed; as when a stove-pipe leaks, or a chimney draws badly. Gas, made at gas-works for lighting, has an unpleasant smell. Yet persons have sometimes blown out the gas at their burners, without turning off the gas, and then, lying down, have slept to death. *Natural* gas, now abundant in several States, is more dangerous, because it has no odor.

WATER SUPPLY.

Thirst is more terrible than hunger. Nearly three-fourths of our bodies consist of water; and we part with a large amount of it, constantly, in different modes, including exhalation of a pint or two, daily, in our breaths. We must, therefore, have a constant renewal of it. Half an ounce, daily, for each pound of our weight, is the average need of an adult; but some of this may be taken in soft, solid food, as bread, vegetables, and meat. Adding what is necessary for cooking and cleansing purposes, from fifteen to thirty gallons, daily, will not be too much of a supply to provide for each person in a household or community. As a *minimum*, may be mentioned the allotment on a man-of-war—one gallon, daily, for each man. If travellers' accounts are true, the water supply of the city of Munich is, or has been, even less than this. Since the natural humidity of our Western hemisphere is greater than that of the Old World, it is, in most places, easier with us than in Europe to obtain an ample supply of good, wholesome water; so that the excuse of "bad water," for indulging in less advisable drinks, does not exist among us.*

The *quality* of water is of great importance. Its kinds are (besides that which is artificially distilled), *rain, melted ice* or *snow, spring, well, river, lake,* marsh, and sea-water. The last named (sea-water) is quite undrinkable; it will not quench thirst, but nauseates and causes distress. Marsh-water is almost always decidedly unwholesome. Yet that of the Dismal Swamp on the borders of Virginia and North Carolina is reported to be very good, and is in demand for sea voyages, on account of its keeping so well. When water runs out on board of vessels at sea, distillation is often resorted to to make sea-water available for drinking and cooking.

It might be imagined that the most desirable of all waters would be that which is distilled, leaving behind all dissolved solid ingredients. But that is not so; distilled water is insipid and less agreeable, without being more wholesome, than many natural waters. The fact is, that the substances contained in ordinary good spring- or river-water are very nearly the same as the mineral constituents of healthy human blood. We instinctively prefer a water which has some taste, and

* There is, it is true, a region in our Western country, that of the "alkali flats," where the surface water is not drinkable. Even there, probably, at some future time, driven or artesian wells may procure a supply of good water; although this, of course, is uncertain before trial.

this quality is promoted even by the presence of absorbed air, commonly present in it.

Rain-water is not at all identical with distilled water, even when it is collected *directly* from the air. It contains washings of the atmosphere, different according to locality. In the country, besides oxygen and nitrogen of the atmosphere, and carbonic acid, there will be in it a little of some other gases (as sulphuretted hydrogen from organic decay) and *dust*, which consists of mineral, vegetable, and animal particles of various kinds. Over a city, rain as it falls gathers more impurity; among other things, sulphurous and sulphuric acids from combustion of coal and other fuel, ammonia, and other results of the decay of organic matter of every kind. From the roofs of houses, over which it usually flows before it is collected, rain also washes a certain amount of the excrement of birds, etc. This can be avoided if the first portion that falls be allowed to escape; which, however, is not always easy to attend to in time, where rain-water is systematically accumulated for use.

Rain-water is not to be preferred to other waters when they can be had in abundance and of good quality. But, under some circumstances, it is the best and most wholesome water that can be obtained. For example, the city of Venice, built upon a hundred islands in the Adriatic Sea, has long been partly supplied by rain-water, collected in filtering cisterns underground. Filtration should always be employed when rain-water is used for drinking and cooking. It is less necessary, of course, when it is employed (as, on account of its softness, it very frequently is) only for washing purposes.

At one of the New Jersey watering-places, a few years ago, there occurred a number of cases of typhoid fever. All those attacked were residing in houses supplied by driven wells from the ground-water; all those who used rain-water for drinking and cooking escaped. This eminently illustrates one of the cases in which the clouds will furnish the only safe supply, the alternative being the drawing of water from a porous, sandy soil, into which is permeating all the filth of human habitations, from soil-wells, kitchen drains, and stables. Of this, however, more hereafter.

Enough rain-water can be collected in most places for family use, with filtration. A house forty feet by twenty, with a rainfall like that of the vicinity of Philadelphia (from forty-two to forty-five inches annually), will furnish from its roof an average through the year of sixty gallons daily. It may be collected in a tank near the roof, or in an underground cistern. The latter will be, on the whole, the most satisfactory. The best material for such storage is slate. Iron, coated with

coal-tar paint to prevent rusting, will do; or brick-work, lined with cement. Lead, or even zinc, ought never to be used for a tank or cistern. Rain-water will dissolve enough lead to be certainly poisonous, and enough zinc to be at least possibly injurious. Every such cistern should be covered, to keep out rats, mice (in the country, squirrels), birds' excrements, etc. A strong but close iron wire cover over part of the cistern will have the advantage of allowing air to reach the water, while protecting it from contamination. Such will not be advantageous, however, unless the air around it be devoid of impurity. Certain cellars are sources of great insalubrity, having in them refuse of all sorts, decaying remains of vegetable and animal food, grease, and filth of every kind; and all this without sunshine and fresh air from out of doors to purify them even in a slight degree. Water stored in such a place will be, however covered, in danger of generating or promoting typhoid fever, diphtheria, cholera infantum, or some other mortal disease. Bad air and bad water are the two most potent *removable* or *preventable* agencies concerned in inflicting these maladies upon humanity.

Every cistern, moreover, should be cleaned out regularly, at intervals varying somewhat according to their size and amount of use. Once in three months will never be too often for this.

Other things being equal, flowing water will always be the best. Stagnation allows of the accumulation of the results of decomposition; movement and mingling with the air break up, dilute, and dissipate them. No beverage is better or more wholesome than good spring-water. It is rain- or snow-water which, falling from the skies on some mountain or other elevated land, runs through earth and rocks, dissolving mineral matter as it goes, until, at some lower place, it gushes forth, clear and sparkling, to the air. Some springs have their waters so charged with saline or gaseous constituents that they are called *mineral springs;* carbonic acid, sulphur, and iron, with salts of magnesia, etc., being among their most common and important ingredients.

Springs coming from a moderate depth in the earth are pleasantly cool. They have about the average temperature of their locality for the year. Yellow Springs, in Pennsylvania, have a temperature of about 52° Fahr., which is the mean of Philadelphia for a term of years. Some other springs, from great depths, are warm or hot, even boiling; as the geysers of Iceland, Montana, Wyoming, and California.

A country house is fortunate if it possesses, at a convenient distance, a good, cool, copious spring. Nothing is more attractive or more ser-

viceable about a Pennsylvania farm than the spring-house; often jutting out from a bank or hillside, built low, but firmly, of gray stone, and shaded over by a few old trees. Within you see the clear, transparent pool of water, in its reservoir of stone, pure as the air or sky overhead; and around it, or carefully placed in it, the pans of milk or cream, or butter, waiting for family use. A draught from that supply, flowing out to make a limpid stream through the meadow below, gives more refreshment, on a midsummer day, than the most tempting beverage of man's contrivance. It has in it no horrors, no mockery, *only health.*

Well-water is like spring-water in many respects, but is not nearly always identical with it. Being detained, for a time at least, instead of flowing freely, it may become contaminated in many ways. Authors now refer constantly to the *ground-water* of a region as important in regard to water supply and influence upon the air. Wells are made by digging down to this, at a greater or less distance below the surface of the earth.

Two sources of supply exist for the ground-water itself. One is the local rainfall, penetrating directly through the earth; the other is the flow or soakage from neighboring regions. If the soil be sandy, or in any way loose and porous, rain-water and melting snow will be diffused through it, sinking till they reach clay, hard rock, or some other layer of resisting material. Such a supply will vary with the weather and the season, and may be exhausted by use at any time. There are shallow wells in some places which, having almost no other dependence, show nearly every year this unreliable character. Most wells, however, receive their water from the general ground-water, which is continuously and slowly moving through an extended region towards a river or lake, which is the line or centre of drainage of the country. Alongside of a river or lake, or even but a few yards from the seashore, in not a few places, wells have been found to furnish water considerably different from that of the sea, lake, or river—the underground movement being *to*, not *from*, those great natural reservoirs.

An important difference in the quality of well (or spring) water is its "hardness" or softness. Hard water does not easily make lather with soap. The reason is, that the "salts" which it contains, especially those of lime (or its metal, calcium), yield bases which make, with the fatty acids of soap, insoluble compounds; while none such are formed with any ingredients in rain or other soft waters. Two kinds of hardness exist—removable and permanent. The former consists chiefly in an excess of calcium (lime) carbonate, dissolved by aid of carbonic acid in the water. The latter depends upon the presence of calcium sulphate in excess.

Three ways are resorted to for removing the first of these kinds of hardness. One, the simplest, is by boiling the water. This drives off the excess of carbonic acid which has kept the calcium carbonate (as a bicarbonate) dissolved. It is then thrown down as a deposit, from which the water may be poured or strained away. Another method is the common use of "washing soda," sodium carbonate, which combines with the carbonic acid, making a sodium bicarbonate. This also causes the excess of calcium carbonate to be "precipitated" from the water. The third method is the addition of quicklime, in suitable amount, to the water. This, like the soda, unites with the excess of carbonic acid, and throws down the carbonate of calcium, which was dissolved, by aid of that excess, in the water. All these plans act alike in ridding the water of the carbonic acid in excess, which keeps the superfluous calcium carbonate in solution. Without either of them, an abundance of soap will overcome the effect of hardness, although wastefully as regards expense.

Such, however, are questions of convenience, rather than of health. Is hard water more or less wholesome than soft water as a drink? One English authority, Dr. Letheby, has endeavored to show that it is more favorable to health. Some French sanitarians have expressed the same opinion. Others dispute the inference from their facts. It is, indeed, difficult to separate the influence of drinking-water from other modes of local causation. It appears to be almost certain that cattle pastured upon a limestone region grow larger-boned than those upon alluvial grounds. Even men show some difference in their average stature in such regions. Nevertheless, an excess of calcium and magnesium sulphates (the latter being "Epsom salt") is sometimes present to a sufficient amount to produce irritation of the bowels and diarrhœa, in persons accustomed to soft water. Travellers and new-comers often suffer this inconvenience,* while residents habituated to it are not at all affected by it. A reason why soft waters are not unfrequently charged with insalubrity, is, that they flow through, or are used in, low regions, in or near cities, where impurities of various kinds get access to them. On the whole, our preference may safely attach to a *moderately* hard water; although soft water, in a locality free from all contamination, is unobjectionable. It is quite supposable that those who drink rain-water only, may lack a sufficient supply of mineral matter for growth and repair of the substance of the bones. Yet, so much of all the mineral substances needful for building up our skeleton and the other tissues of the body exists in our articles of solid food, vegetable and animal, that

* For this, the best corrective is *essence of ginger*, five or ten drops in a tumblerful of hard water.

we can hardly regard this as likely to be important. At all events, for it to be so, there must be a general deficiency of mineral elements in the soil of the locality from which plants are grown, and on which animals are fed, as well as in the water.*

Wells differ much in the nature of their water, according to their depth. Usually the deeper well drains a larger extent of country. Much depends, however, on the character of the ground, its slopes, and elevation or depression, as compared with the surrounding region, as well as on the nature of the rocks underneath. *Driven* wells may be shallow or deep. They are made by forcing through the ground a wrought-iron tube, having a valved piston at its upper part, and at its lower end a steel point. Above this point, for some distance, the pipe (which is usually an inch and a quarter to two inches in diameter) is pierced with holes, for the admission of water. In many places where no water at all appears upon the surface, a few feet of penetration will reach it and bring it up, sometimes even in abundance. Thus artificial *oases* have been made, as way-stations of refreshment for travellers, in some portions of the great African desert. It seems not impossible that, in the future, the desert may, by irrigation from such wells, be made actually to "blossom as the rose."

Artesian wells are essentially of this character; but this name is only applied to driven wells of great depth. They are said to have been used ages ago in China and Egypt. Now, many of them exist in Europe and America—some one, two, or three thousand and more feet in depth. They are uncertain of success, unless the selection of locality be guided by geological knowledge. One at Grenelle, Paris, eighteen hundred feet deep, yields a large supply for local use. The deepest one in this country, at St. Louis (Asylum well), 3843 feet, has been a practical failure, after costing more than $10,000. Lately, it is stated that some brewers in New York city have been able to obtain, at one hundred and fifty feet depth, a thousand gallons a minute, through a pipe of six and one-half inch bore.† This water is said to have a temperature of fifty-two degrees Fahr. At greater depths the water is much warmer. That of the Grenelle well is 80.6° Fahr. One at Louisville, Kentucky, 2086 feet in depth, has a temperature of 76.5° Fahr.‡ This is a great objection, except where, as in our cities, ice may be employed to correct it. A considerable excess of mineral matter is a more serious

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* I have often thought of the question, to solve which facts are wanting, whether *early decay of the teeth* is not most common where only soft waters are drunk.

† *Sanitary Engineer*, November 15, 1879.

‡ A well recently completed near Buda-Pesth, Hungary, 3200 feet deep, is said to yield water at 165° Fahr.

drawback to the use of water from very deep wells. That of St. Louis, above mentioned, is unavailable, chiefly for this reason. Yet a great advantage of very deep well-water is its almost certain freedom from organic matter resulting from animal and vegetable decay. This kind of matter often pollutes shallow well-water—most of all in cities. Pump-water in cities ought never to be drunk at all, no matter how clear and bright may be its appearance, or how agreeable its taste. *Color and taste are not decisive of the quality of drinking-water.*

Well-water in the country is often tainted badly by the well for the household supply being too near the privy or the barn-yard. It may be seriously injured, even by the draining into it of kitchen waste. Thirty feet should be the *least* distance ever to be allowed between a privy and a drinking-well.* Sixty feet will be better; and the slope of the ground is also important. A privy should always be located *below* (if there be a slope) the house and its well. In choosing a site for a house, we should look out for the distance and direction of our neighbors' drainage as well as our own, and carefully avoid having to receive that of other houses on its downward course.

Wells are sometimes liable to a less damaging, and yet considerable inconvenience, from the roots of trees.† At my residence, near Haverford College, a few years ago, an old willow-tree sent out its roots to a deep well twenty feet distant from it. When discovered, the root-fibres were actually filling the well, so that, on looking into it, one could see only the roots, no water being visible at all. Elm trees, and some others, have been known to do the same thing. The only cure for such an invasion is to cut down the overthirsty tree.

Of the danger of injury to health from polluted wells, it is hardly possible to say too much. In one cholera season in London, six hundred deaths were traced to the use of a single street pump. Typhoid fever has been repeatedly, indeed many times, known to affect whole families who resorted to a well for a common supply, while others in the same neighborhood, using different water, were not attacked. Worse yet, perhaps, seems to be the subtlety with which organic poison may be conveyed, by water, through *milk*, in dairymen's supplies. Several times this has happened in London and elsewhere in England.

* Dr. W. W. Keen informs me that he knows of a case, in a town in New York State, where a cistern was placed with its wall but three feet from the privy-well, its sides only plastered, and that not on brick, but directly on the earth. Continued sickness in the family, and one death from typhoid fever, caused an examination of the cistern, revealing the above facts, and a direct stream of drainage from the privy-well into the cistern.

† Roots are also sometimes sent into cracks of leaky drain-pipes or sewers, which may thus be obstructed.

In one instance, so far as appeared, the only mode of contamination was by the milk-pans at the dairy being washed in water from a stream into which leakage had occurred from a neighboring privy. At another time, several well-to-do families in London, one of them that of a physician, were affected with typhoid fever. It was found that they were all supplied with milk by a company which furnished milk from several dairies. At last it was ascertained that cases of fever occurred only in those families to whom had been sent the milk of one particular dairy; and a local cause of contamination of its supply was also traced.

Fig. 103.

LIVING FORMS IN WATER (MAGNIFIED).

What exquisite cleanliness of all things is enjoined by this experience! Nothing is more sensitive than milk and cream to all impurity. Even the water which cows drink, when marshy and bad, has been known to make their milk unwholesome. Butter can be made good only where the most scrupulous sweetness, cleanliness, and freshness of everything is maintained. This is the chief secret of good butter-making; and the "moral of it" may be extended and applied by saying, that perfect cleanliness of water, food, air, and person is, everywhere, absolutely necessary to perfect health.

Streams and rivers furnish, the world over, to the greater number of mankind their drinking-water. They have the advantages of copiousness, facility of access, and movement, which favors agitation with the air and freshness. But they are liable to contamination on account of their exposure to solid and liquid refuse and waste of all kinds. Worst, for this danger, are small, shallow, slow streams, running through or by towns or villages, or near factories, graveyards, slaughter-houses, etc. River-water is best when taken from the largest, deepest, and most rapidly flowing river, *near its middle*, and a few feet below its surface.

Turbidity in river-water makes it look uninviting, but does not always affect its wholesomeness. Opacity is due almost entirely to suspended mineral matters, and they may be quite innocent.

With all its solid material, giving cloudiness and taste, the water of the Mississippi, for example, is drunk by very many persons, and has been found to keep well at sea.

Those accustomed to such a water often consider common river- or well-water too insipid to be agreeable. Marsh-water, however, as already said, is generally quite unwholesome, promoting especially diarrhœa and dysentery.

Lake-water taken from a large lake, far out, has all the good qualities of river-water, and is less often exposed to contamination. A small lake, or pond, if so exposed, has, on account of its actual or comparative stagnation, less opportunity of purification than a flowing river.

Organic matter constitutes the really serious impurity of streams and rivers. Worst of all is excretory material, sewage, from human habitations. Next to this, drainage from slaughter-houses, bone-boiling, fat-rendering, and soap-making establishments, etc. Dye-stuffs may color water a great deal, without a proportionately injurious effect, unless arsenic or copper be present in them. Vegetable impurity of all kinds is less deleterious than that originating in animal decomposition. One grain of organic matter per gallon, chemists assure us, is all that a first-class drinking-water ought to contain; yet some pleasant and apparently innocent waters contain as much as ten grains in a gallon. One test is adding a lump of white sugar to a vial of the water, and keeping it corked for a few days. If it contain much organic matter, it will become in that time perceptibly turbid. Another sign of this kind of impurity in water is its acquiring an unpleasant smell when corked in a bottle and kept in a tolerably warm place (say at 70° Fahr.) for three or four days.

Rivers have some power of *self-purification*, or else those which, near large cities, receive sewage and also furnish drinking-water, would be

still more destructive to life than they are. This evil is, it is true, so great as to receive at present much attention from sanitarians. The means of the spontaneous purification are chiefly *deposit*, *oxidation*, and *diffusion*. By deposit, solid particles are thrown down, making the water clearer. Oxidation, under exposure to the air, does much more than this. Oxygen acts chemically upon organic impurity, breaking it up into its elements, and destroying all its noxiousness in course of time. How long this requires, it is difficult to determine exactly in any case. Dilution and diffusion accomplish the most beneficial results in natural water purification. With a sufficient mass of water, everything soluble, or capable of suspension in the form of minute particles, will be divided so infinitesimally as to become utterly harmless. The magnitude of this effect is shown, for example, in the river Merrimac, Mass., which receives all the sewage of the manufacturing towns, Lawrence and Lowell; and yet it has been computed that to increase the amount of its solid matter below Lawrence, so much as one grain per gallon, would require the addition daily of one hundred tons of dry material to the river.*

Yet, since the poison-causes of human diseases are very subtle (whether they consist of "disease-germs" or not), what we know of the morbid transporting power of water should make us very cautious about using water for drinking or cooking into which any drainage or sewage from human habitations or establishments can ever enter. Cities and smaller communities will never reach the ideal pointed out by sanitary science until all their sewage is, in some manner, removed daily or constantly, and returned to the earth for use in fertilization. The manner in which this is done in China, where those who bring produce from the country to sell in the markets of the towns return laden with house-soil to manure their gardens and fields, seems to us rough and not æsthetic. But their *idea* herein is quite correct. It remains for our knowledge and invention to solve the problem in some better and more agreeable way. No one has written more eloquently about this than Victor Hugo, in his chapter on the Sewers of Paris, in "Les Misérables."

Some organic material on the surface of rivers and lakes is innocuous while in the living state. Over many ponds and along the edges of some rivers may be seen quantities of green scum, consisting of confervoid growths, algæ, minute cryptogamous (*i. e.*, not flowering) plants, of various species. Probably the growth of these vegetations is, in

* W. R. Nichols, in Buck's Hygiene and Public Health; also, Report of Mass. State Board of Health, 1874.

itself, advantageous to the water by using up material resulting from other decomposition. But when the same organisms die and decay, as they will do, especially when the margin of the pond or stream recedes with drought, then their decay becomes a cause of contamination. This is still by no means the worst kind of water-spoiling. It was, in 1876, very noticeable for a time in the Croton water supplied to New York city, giving the water an unpleasant odor and appearance. Yet this was a transient occurrence, and no considerable sickness was ascribed to it. Boston water has sometimes had a taste given to it by a kind

Fig. 104.

LIVING FORMS IN WATER (MAGNIFIED).

of fresh-water sponge. A green scum on a water-surface may be regarded as having its principal importance in its being a sign of stagnation, which is always unfavorable to the good quality of a water supply. In the early part of 1883 the water supplied to Philadelphia from the Schuylkill River had a disagreeable taste, not fully accounted for; although the want of aëration of the water, from the river being closed with ice, was supposed to have to do with it.

Melted snow and ice must be here briefly spoken of as sources of drinking-water. Snow, like rain, carries down whatever the air con-

tains. Over towns it will, therefore, contain a little ammonia and organic matter. Since a low temperature arrests decomposition, there is not apt to be much injury result from the latter in snow. In one way, however, snow-water has been known to become injurious. In Finland and Northern Russia it has been common for people to throw out near their houses all the refuse of their daily living, and then, in the winter, to collect snow from the same ground and use it for drinking and cooking. This has been believed to aid in explaining the lingering of epidemic cholera, in some years, in those countries in the winter, while elsewhere it disappeared at or before the end of summer.

Water, in freezing, parts with most of the ingredients suspended or dissolved in it. Ice is therefore purer than the water from which it has been congealed. This, along with the already mentioned influence of cold in arresting chemical decomposition, makes the risk of unwholesomeness in melted ice very small. Yet, a few instances are on record of injury to health resulting from the use of ice taken from foul water. This can only happen when the supply is obtained from a shallow, stagnant marsh or pond, where animal or vegetable decay has been going on. Such ice will be apt to exhibit its character by lack of clearness and transparency. The deeper the water from which ice is gathered for use, of course, the better.

Much importance attaches to the **mode of conveyance** of drinking-water from wells, reservoirs, or other sources of supply. Lead, iron, and tin are the materials most employed for this purpose.

The great convenience of lead pipes causes them to be very largely resorted to for carrying water. Certain facts concerning them ought to be generally known. Distilled-water and rain-water will dissolve enough lead from pipes to make them poisonous; so also will very soft well-water, and even that of some streams. It requires but one-tenth of a grain of lead per gallon to affect susceptible people with lead-colic, or even lead-palsy. When Louis Philippe, ex-king of France, was residing with his family at Claremont, England, some of them were injured by lead dissolved in the water of a reservoir. I have known of two instances in which the same thing has happened in this country. Even the drippings of evaporated water, condensing on a leaden cover over a tank, have sometimes contained enough lead to do harm. Croton water, in New York, according to Professor Chandler,* always has traces of lead in it, but not enough to produce any effect, unless when

* *Sanitarian*, May, 1875.

the water is drunk after having lain long in the pipes. Fairmount water, at Philadelphia, is perfectly safe in this respect.

Everybody should know that this security is due to a very simple action of the water on the pipes. River-water, and that of some, but not of all, wells, contains saline ingredients, which being partially decomposed, make a deposit, lining the pipe with a delicate crust, and thus protecting it from further action. Rain-water, and that of certain wells, having an insufficiency of such constituents, dissolve the lead to a considerable extent, and thus become injurious. *Hot* water may do the same, even with Croton or Schuylkill water. Some cooks have a bad habit of saving themselves trouble in heating water for cooking on the fire, by using that of the kitchen-range boiler. Besides the not improbable construction of the boiler with copper, of which hot water will dissolve enough to do harm, the action of heated water on the leaden pipes makes such water altogether unfit and unsafe to use.

Lead pipes had better never be employed to carry rain-water, or that from wells, at least unless that of the last has, in every instance, been shown by chemical analysis to be safe. If there be doubt in this regard, a wise precaution is always to allow the water to run for awhile, and empty the pipes, before using it for drinking or cooking.* Incidentally, it may be mentioned that water containing carbonic acid (soda-water, mineral water) dissolves a good deal of lead; and therefore pipes made of it should never be employed for soda-water fountains.

Iron pipes are acted upon by hot water, their rust sometimes being in sufficient excess to be disagreeable. Cold water may be passed through either cast- or wrought-iron pipes without any disadvantage. Galvanized (zinced) iron has been shown to be acted upon to some extent, a little zinc being dissolved when water lies long in the pipes. Some chemists assert this to be enough to make the water unwholesome; but authorities differ upon this point. No doubt, allowing the water to run from such pipes for a few minutes before using it will prevent any injurious effect, as the soluble compounds of zinc are much less poisonous to the human system than those of lead.

Block-tin pipes are as free from objection as any others. Tin-lined lead-pipes are good so long as the lining lasts; but this is not forever. Two metals, in contact with each other, are more easily acted upon (as experiments with galvanism show) than either metal would be alone. Therefore the lining must be thick and even, to be depended upon.

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* According to the Boston *Journal of Chemistry*, lead pipes may be artificially coated and made safe by dissolving one pound of sulphide of potassium in two gallons of water, and allowing it to remain in the pipe for twelve hours, or until the inside is thoroughly blackened.

The same is true of the "enamel" lining of iron pipes—made usually by dipping them in coal-tar or some form of cement. Glass-lined iron pipes were patented a few years ago, and have received approval from the editor of the *Manufacturer and Builder*, and from the consulting sanitary architect of the Board of Health of New York. These are so prepared as to avoid bursting from freezing, an inconvenience of which we see much in this country. To prevent this accident, care must be taken in the *placing* of lead pipes, as well as in having them made of the proper thickness and strength. If a pipe is necessarily exposed to cold, the water in it is much less likely to freeze, or to burst if it does so, when the spigot is so turned that it drops a little all the time—thus providing space for the expansion which water always undergoes in freezing. Wrapping an exposed pipe with flannel (or strips of old carpet), through the cold weather, may save a great deal of trouble of this kind.

Of all things care must be taken not to allow a water-supply for drinking to be exposed to impurity from the overflow or waste-pipe of a cistern being connected immediately with a drain. It is very important, also, for the same reason, to have *different* reservoirs (if such are used) for drinking and for water-closet use. Of these matters, more will be said in our next chapter.

What can be done to **purify** water for drinking, when the use of that which is of imperfect or uncertain quality cannot be avoided?

Nothing is more effectual in annulling the injurious influence of contaminated water (in the absence, that is, of a mineral poison, such as arsenic, copper, or lead) than *boiling* it before use. Many a time it has happened that, when bad water has produced a local "endemic" of typhoid fever, all those affected have been drinking the water cold, while those who only took it in the form of tea or coffee have escaped. This was the case, for example, at St. Mary's Hall, Burlington, N. J., in 1875, when, as related by Dr. Leconte, thirty cases of typhoid fever occurred within two weeks from contamination of the drinking reservoir by leakage from a privy vault. None of the servants of the house, who drank only tea and coffee, and almost never cold water, were attacked; while the boarders, often thirsty, drank cold water freely between meals, and all the cases were among them.

Filtration is often very serviceable upon a large as well as on a small scale. We are here concerned only with the latter. Most nations have practised this from the earliest times. On the Nile, travellers now have the yellow water of the river strained clear through the sides of

the *goolch*, a jar or pitcher made of a porous clay peculiar to Egypt. Similar to this is the *alcarazza*, for a long time in use for the same purpose in Spain. A filter largely used in the British navy is made of a very porous kind of Maltese rock. We imitate nature profitably in filtering water through sand and gravel. These, with animal charcoal, make probably the best possible filtering materials. Sponge is also used; for wholesomeness it must be changed frequently, or at least scalded and well washed. This, indeed, is true of any filter. Without frequent cleansing, the pores become clogged, and instead of purifying, an accumulation of filth may make the water worse than it was. When charcoal is employed, it may be renewed by heating it strongly (short of combustion) in the open air.

The action of charcoal and sand in filtration is of two kinds. Partly, it is mechanical—*straining* the water, that is, keeping back solid matters by simple resistance. Besides this, there is a chemical influence exerted, chiefly by oxygen of the air brought into very close contact with the particles of the water and its contents in the fine porosities of the filtering substance. This close contact is beautifully exemplified in the philosophical lamp, in which a jet of hydrogen is directed upon a piece of spongy platinum, within whose meshes it takes fire from the molecular action of atmospheric oxygen.

Iron and some of its ores, especially in the spongy state, exert a purifying influence upon unclean water. Two such preparations have of late years met with considerable favor; *magnetic carbide*, and a new artificial mineral, recently employed in England, called *carferal.**

Of the various patent filters on sale for household use, it may be said that, while several of them produce tolerable results, none are perfectly satisfactory. Unless themselves carefully cleansed or renewed at not very long intervals, they lose their cleansing power. For domestic use, I would rather trust to a *home-made* filter like that proposed by Dr. Parkes.† Take a large common flower-pot, and put into it a bit of zinc gauze or a clean bit of flannel, then coarse gravel to the depth of about three inches, over that the same amount of white sand washed very clean, and next four inches of charcoal in small fragments; animal charcoal when it can be had. On the top of all, a piece of well-cleaned sponge may be placed, making sure that this is changed or thoroughly cleansed once in a week or two; more or less often, according to the impurity of the water. But really suspicious water should, before using it for drinking or cooking, be boiled as well as filtered. Above

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* London *Medical Times and Gazette*, October 11, 1879.

† Treatise on Practical Hygiene.

all, in regard to drinking-water, the great thing is to choose and provide for every household a supply which cannot be suspected. Here, as much as anywhere, is the maxim true, which lies at the basis of all hygiene, that *prevention is better than cure.*

On a large scale, the city of Philadelphia has this problem of prevention now before it. Many causes of contamination of the Schuylkill River exist, and are difficult of removal. While improved and extended sewage-conveyance is urgently needed, and another source of water-supply, from a greater distance, must be at some time provided, Chief Engineer Ludlow advises at the present time the construction of works to *aerate* the water, for its purification. This will no doubt be useful, but only as a temporary resort.

DRAINAGE.

"Ours," says a late writer on house construction, "is the Age of Plumbing." Egyptian, Greek, and Mediæval architectures have, each in succession, had their day, and now the beautiful gives way, in a large degree, to the useful. Stramm, a German author, declares that the highest modern civilization is shown not so much by costly monuments and works of art as by the perfection of house conveniences. Yet these, too, have their dangers as well as their comforts. Security does not always come with refinement. Ferocious beasts and venomous serpents are kept at a distance in the wilderness; but the subtle poison of disease may steal upon us in our beds, and, vampire-like, draw out the life from our veins. When the Prince of Wales, some years ago, fell ill with typhoid fever, after a visit at Londesborough House, all the world was alarmed. It is probable, however, that the inquiry which this event, and its supposed cause, started, may have resulted in saving many lives.

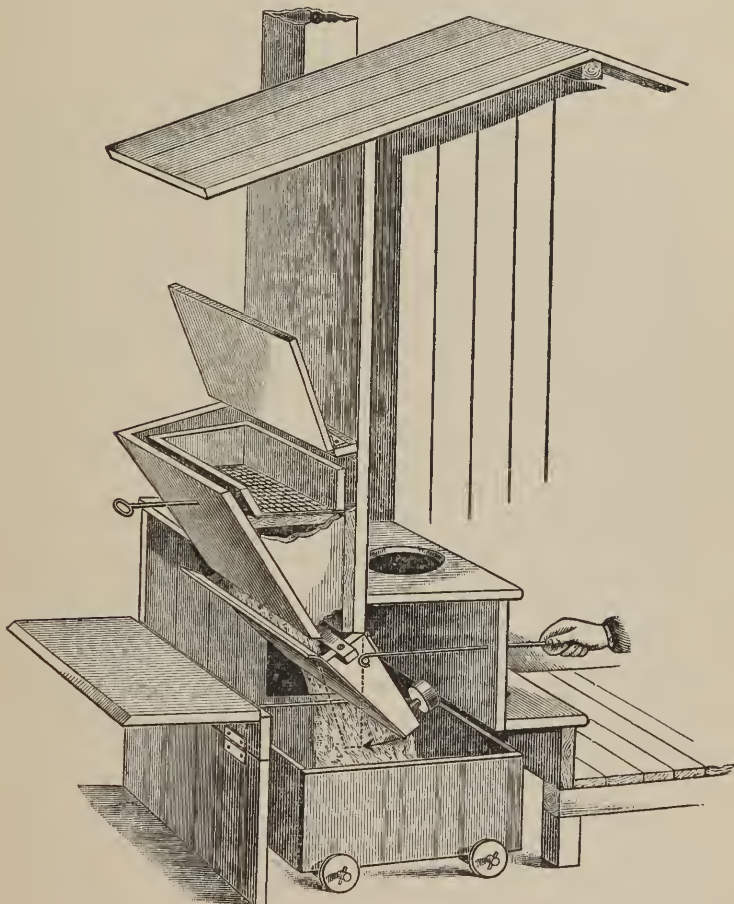
When a house is being built for occupation in a chosen situation, its light, warmth, ventilation, and water-supply having all been provided for, there remains the question of conservancy; that is, the safe and sufficient removal of all waste. In the country, simple measures will answer, so far as health is concerned. On an acre of ground, there is space enough to place a privy at a good distance both from the house and from the drinking-well. If there be any slope, the last named must be always above the first, and thirty feet *at least* (the more the better) must intervene between the two wells. Kitchen slops should have their own separate drainage, or, at least, should run through a channel, *open* for a short distance before they enter the privy-well.

But it is a question, with a cottage or small farm-house, whether a *well* for necessary waste is best. The farther from the house it is possible to place it, the less need there is of a well. The common cottage privy above ground, the building being raised and open (below) at the rear for frequent removal, needs only a simple precaution to make it innocent. This safeguard is to throw over the deposit each time a small shovelful of lime or dry earth. The latter is, of course, the more accessible, and will deodorize and disinfect perfectly, if enough be used. A pint and a half in bulk, or two and a half pounds in weight, will suffice each time. A box of earth and a trowel may be left within reach. Frequent removal is then important. Where there is a vegetable garden, the material thus accumulated makes the best possible manure. This has been proven not only in China, but in Europe and in this

country also. With a small family, however, when dry earth is used, once in three or four weeks will commonly answer for its removal.

There are two sides to the question of advantage to health in regard to the distance of a privy from a country house. Delicate persons run risks in the exposure of going out of doors in cold or rainy weather. A covered passage-way, with windows, or otherwise open at the sides

FIG. 105.



BEHREN'S OUT OF DOOR EARTH-CLOSET.

for ventilation, lessens, but does not entirely obviate, this evil. For those who cannot or ought not to leave the house, a convenience is needed. Much evidence favors the *earth-closet* as here the best resort. There are different patterns of this, but the idea is all the same. By a mechanical contrivance, each time that the closet is used, a suitable

amount of dry earth or sifted ashes is thrown down from a receptacle in which it has been placed. Those who cannot afford to buy an earth-closet can substitute it by keeping within reach a small box supplied with earth and a trowel for its use. The disadvantage of this is the flying of dust into the room; which, indeed, the best contrived closet does not always entirely prevent. Especially with the addition of a very little chloride of lime in powder to the earth when used, or even without this, an earth-closet is much more satisfactory than the old-fashioned chair in the sick-room or elsewhere in the house, for the avoidance of everything unpleasant.

Earth for this purpose must contain some (but not too much) clay and some *humus*, or soil such as is fitted for cultivation. Common garden earth, or that of the average farm ground, will do very well. Sand will not answer. Sifted coal-ashes will, almost as well as earth. On a small scale, earth may be dried in any convenient receptacle over or near the kitchen fire. For a large family, a quantity of earth may be placed to dry gradually under a shed, with boards under it to keep it from the dampness of the ground.

The earth-closet system has been introduced into several towns in Europe with success. But the requirement of bringing a great weight of earth into the city, and economically disposing of it after use, will make it slow to take the place of the water system in cities. Household employment of the latter system, therefore, must next receive our attention.

Every kitchen should have its drain, as it is against all laws of health, as well as of appearance and comfort, to throw slops out of doors on the ground. Garbage in cities is, or ought to be, removed daily in covered carts from all houses. In the country, a good plan is to *dry* hard materials (potato-skins, etc.) *under* the kitchen fire, and then *burn* them *upon* it. Otherwise, such things may be given to hogs, or dried at a distance from the house, and burned. Dust swept from floors may be thrown into the fire. Liquids from the kitchen must not be poured upon the ground near a well, or they will run or soak down into it and spoil the water. I remember once seeing upon drinking-water, taken from an excellent well, a film, which broke easily into pearly particles, the origin of which nobody knew. The drainage was supposed to be all right. Chemical examination proved the film to consist of soap; and close inspection showed that an unnoticed obstruction had caused the kitchen-drain to send a good portion of its contents right down into the well. This could be soon corrected. But sometimes a *foul* kitchen-drain taints a drinking-well for a long time without suspicion, doing very serious harm. Sanitarians aver that kitchen drainage *may* become almost as bad as sewage from house and street waste.

Every kitchen-drain, therefore, should have a *trap.** Since this is true, also, of every water-closet, we may now at once consider what traps are, and what is their use. They are intended to prevent foul air from getting back to a house from sewage or drainage, after the latter has been discharged.

A *water-seal* is afforded, as shown in the figures (Figs. 106 and 107), by the portion of water detained after a quantity has passed through the pipe. Conditions necessary for the security of every trap are: that

Fig. 106.

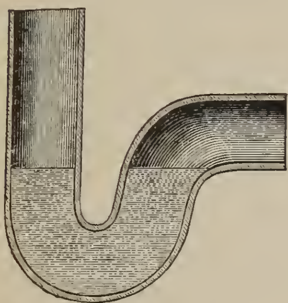


Fig. 107.

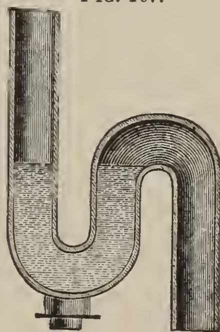


Fig. 108.

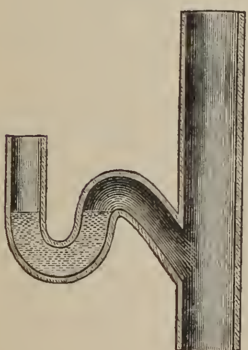
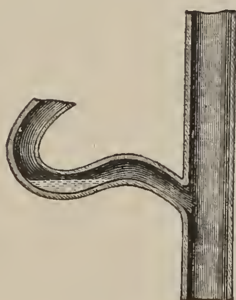


Fig. 109.



it be large enough; the "drown" or dip of water above the upper line of depression, at the middle, sufficient; that this dip be not lost by distortion of the pipe (see Fig. 108, correct, and Fig. 109, distorted); that it be of material thick enough not to be soon corroded and perforated by sewer-air or water; that it be not clogged by solid and insoluble things thrown into it; that it be furnished with an abundance of water for "flushing," or cleaning it out frequently; that it be ventilated;

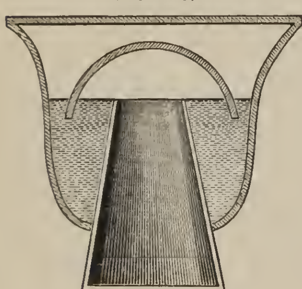
* A grease-trap, arranged for easy and frequent cleansing, is an important addition, at least in a large establishment.

and that, when not used, it be not allowed to become dry from evaporation. All these conditions are frequently violated or neglected; and hence some people have come to regard all traps as entitled to their name in a contrary sense, as snares or delusions. But when properly made and used, they are very serviceable; and, whatever farther advance sanitary science and invention may hereafter furnish, we cannot, so long as we employ the "water system," do without them now.

Cast-lead traps are generally used, of good weight, seven or eight pounds of lead for each square foot of surface. A trap for a soil-pipe four inches in diameter should have the same diameter, and should weigh twenty pounds. The "drown" or depth of water above the upper bend should be, for such a trap, at least an inch and a half. To prevent swagging down out of shape, every pipe, through its whole length, trap and all, must be securely *fastened* and *supported*. Nothing should ever be thrown into a water-closet or sink which cannot be soon softened and dissolved away, so as not to produce obstruction. Every trap should have its own water-cistern, *distinct* from any cistern supplying drinking-water; and the flow through it when used should be free and abundant. Its overflow-pipe should discharge apart from any sewage drain. The time when evaporation is likely to dry up traps, so as to permit the entrance of air from the drain or sewer below, is when families are absent from their homes, as during the summer season, or when a house is for any reason unoccupied for weeks or months together.

Bell-traps (see Fig. 110), according to the best authorities, ought never to be used, on account of their clogging more easily than other traps, and always allowing only a sluggish flow through them. Since all traps necessarily delay the movement of the contents of pipes, and stagnation makes everything worse, it may be asked, Why is it not better to avoid all such interruptions, and merely provide such abundant flushing as will sweep all impurity rapidly away? The answer is, that if such thorough and constant flushing were secure in the *whole length* of every drain and sewer of a connected system, no traps would be needful. As such thoroughness is not usually, if anywhere, obtainable, "water-seals" limit, to great advantage, the amount of exposure of the air above them to contamination.

Fig. 110.



It has been proved by experiment that sewer-gas is *absorbed* by the water of a trap if it remains long there at rest, and then the gas is given

out above and beyond the water-seal. Therefore, frequent changing of the water is indispensable; and also measures for making sewer-air itself as innocuous as possible.*

Ventilation of traps is of much importance. In considering it we must look at the general arrangement needed for good house drainage, taking a somewhat summary view of the whole matter.

A house with "modern conveniences" has occasion for pipes (besides gas-pipes for light and warm-air flues) for the following purposes: 1. To introduce water for drinking, cooking, washing, bathing, and water-closet uses; 2. To carry off the overflow from drinking- and washing-hydrants, and from cisterns and water-closet supply; 3. Removal of kitchen and other slops; 4. Water-closet drainage; 5. Ventilation, so far as required, of the above arrangements.

Of reservoirs and pipes for water supply, it needs only to be repeated here that the same tank or cistern ought never (even if divided by a partition) to be used to furnish water both for drinking and for water-closet use. Moreover, the *overflow* pipe of a drinking-tank or cistern must be carefully kept clear of the soil-pipe drain and sewer. It is best for such overflow, as well as that from every "lavatory" or wash-basin, to discharge by itself. In the country this may fall into a surface or sub-surface drain at any convenient place at the rear or side of the house. If, in a city, *all* drainage *has* to be united at last, effort should be made to have drinking and washing overflows to fall upon an open (or at least well ventilated) catchpit or gully, leaving an interval, which if open may be covered by a grating, before it enters the common drain. Bath-water may take the same course as the above, leaving, when possible, some interval between the places of discharge.

Kitchen drainage is subject to greater foulness than water from drinking-hydrants, lavatories, or baths. In a *perfect* system, it must be kept apart from them in its conduction and discharge. It ought much more urgently to be separated from the water-closet drainage. This last needs, for really good sanitation, to be *entirely apart* from all the other drainage of the house.

We have, in this scheme, *at least three* desirably separate systems of discharge: A, that of drinking and other cistern or basin *overflows*, and bath-water; B, that of the kitchen-sink and other slop-wastes of no worse character; and C, that of the water-closets. The more completely these three can be maintained in separation from each other the

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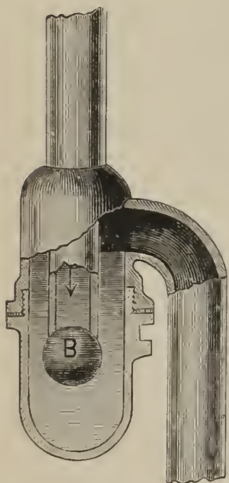
* All sanitarians agree that *fresh* sewage is nearly harmless to the atmosphere. It becomes more and more deleterious according to the time of its concentration and stagnation.

better. Next best to their entire mutual isolation, will be the junction of A and B, with their conduction and discharge distinct from C.

When this last exclusion *cannot* be effected, we must look to traps and ventilation for the best practical means of protection. A plan of the plumbing of a house so guarded has a formidable appearance; and yet the dangers are so real, that we cannot easily estimate the expense and trouble which are worth while, in order to guard ourselves, our families, and our neighbors against them.

Fig. 111.



If, then, the overflow-pipe under a drinking-hydrant, lavatory, or bath-tub must, in any case, discharge into a drain which receives also the kitchen slops, or worse, the contents of the soil-pipe from water-closets, a trap must be interposed to prevent the ascent of foul air into the apartments concerned. For lavatories, Bower's trap (Fig. 111) has been found to answer well; best when it is all made of zinc or lead, instead of partly glass.* B, in the figure, represents a floating ball of rubber, which, being buoyed up by the water in the trap, makes a doubly efficient seal against the ascent of impure air to the lavatory from the drain below.

In passing, it may be observed that *every house which has two or more rooms on a floor ought to have a bath.* Hellyer proposes that in humble houses it should be placed *in the kitchen.* Although this seems odd at first thought, yet it is not unreasonable. It secures warmth for both the water and the air without trouble, and the bath-tub can be covered with a hinged board, making it a convenient bench at ordinary times.

Every bath waste-pipe, also, when it connects with a soil-pipe, house-drain, or sewer, should have a trap; such, for example, as is shown in Fig. 106 or Fig. 107. So, also, must every kitchen-sink, and slop-sink of any kind, have the same protection. Otherwise, there is opportunity for bad air to rise through those pipes, and to contaminate the air, food, and water in the kitchen or elsewhere through the house. How this may happen is easily seen by looking at Fig. 112. There the water-closet has been trapped, but not the kitchen-sink, and both communicate with a sewer.

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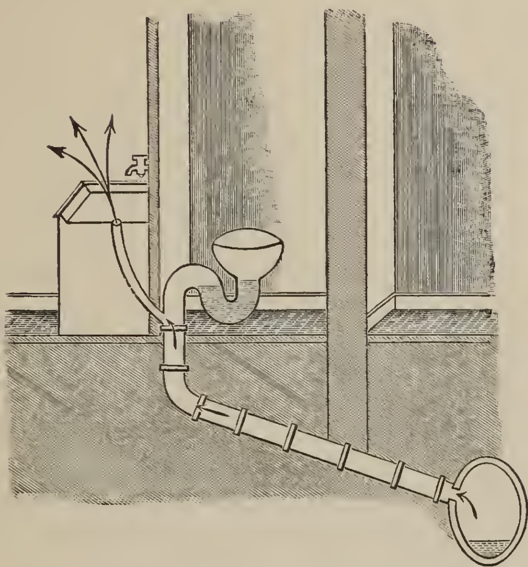
* The unequal expansion and contraction of glass and metal under changes of heat and cold (especially when hot water is used) make their connections somewhat insecure against leakage.

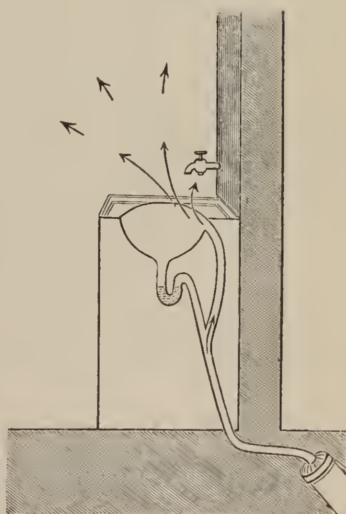
Not only the sink itself, or lavatory, or both, but in each instance, as

Fig. 112.



already said, the *overflow also* must be protected by the trap. Figs. 113 and 114 (borrowed from Teale's "Dangers to Health") exhibit, respectively, the fault here indicated and its remedies. These remedies (Fig. 114) are: first, making the overflow-pipe enter that of the sink *above* the trap; and, secondly, having the lavatory escape-pipe to discharge over an open channel, instead of connecting *directly* with a soil-pipe or sewer. The first of these measures of protection can always be had; the second should be, whenever it is practicable.

Fig. 113.

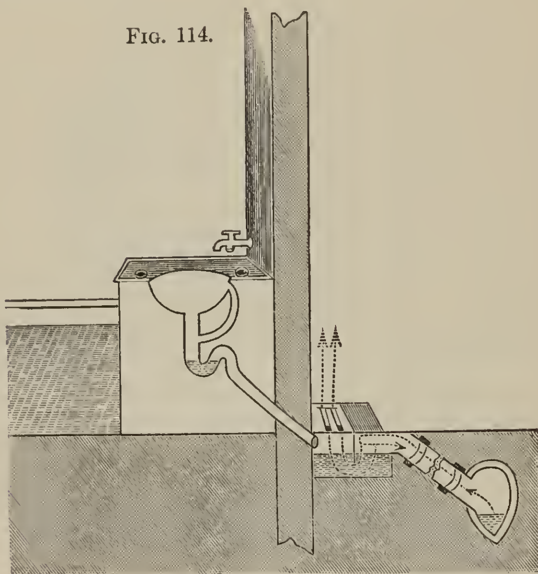


Now, for the most serious part of the problem before us, we must consider water-closet and soil-pipe arrangements.

The water-closets most in use are of two kinds, *pan* and *valve* closets. The former has an iron "container" below the basin or receiver. This iron vessel is hard to keep clean. In the valve-closet, a portion of water is

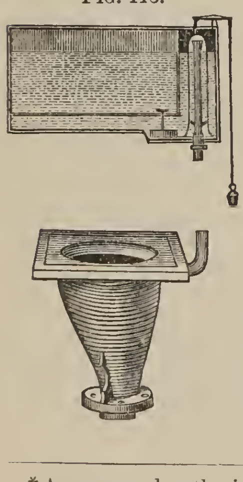
detained above the valve, which is quite an advantage; and there is no large container. The valve-closet is decidedly the best, but also the most expensive. Simplicity is so desirable in such fixtures (as, indeed,

Fig. 114.



in everything else) that good authorities are inclining towards a return to the oldest form of the "hopper" immediately over the trap. Waring, the most esteemed American authority, has asserted his preference for such a plan. Fig. 115 gives a view of Rhoads' Cistern and Hopper closet, which carries out this idea very well. So also does Hellyer's Short Artisan Hopper (Fig. 116). Of other closets, more complicated, I believe Hellyer's valve-closet to be one of the best.

Fig. 115.



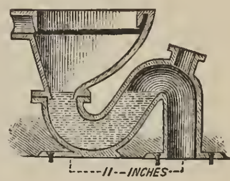
Whatever form or plan of water-closet be used, it is of great importance to provide an *abundance of water* for flushing it. Mere dribbling will not suffice. Neglected water-closets left to accumulate obstructive materials of any kind will, in time, grow very foul, sometimes even worse than the average open privy.

Soil-pipes are now mostly made of iron.* *Enameled* iron is the best material, with caulked

* Among good authorities, Hellyer is almost the only one who still prefers thick cast-lead for soil-pipes. See his Dulce Domum, London, 1877, p. 29.

lead joints. Four inches will be not too large for a house of moderate size; four and a half or five inches diameter will be enough for the largest mansion or hotel. All sanitary engineers now agree that it is a serious mistake to make drain-pipes too large. A drain six inches in diameter will suffice for more than a hundred houses. In a large pipe, but partially filled, the flow must be sluggish. The same amount of material in a smaller pipe, nearly full, will move rapidly through it, and thus avoid stagnation.

FIG. 116.



For changes of direction, and entrance of branches, right angles must be avoided, and as few inclined joints should be made as possible. Figs. 117 (right) and 118 (wrong)* will illustrate this principle.

Every soil-pipe should have a trap at or near its junction with the

FIG. 117.

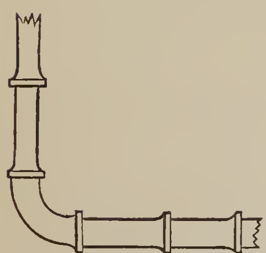
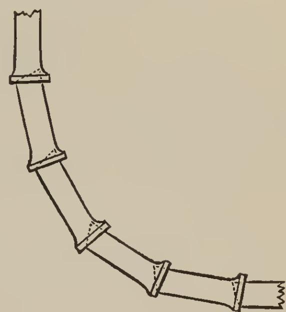


FIG. 118.



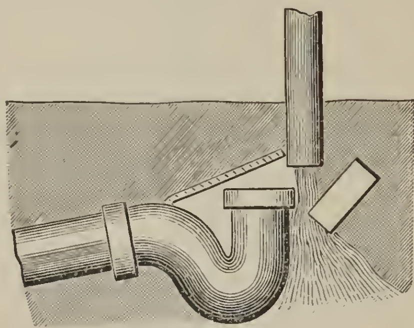
drain or sewer into which it discharges. It is well also for this to be aided by a flap-valve, to assist mechanically in the exclusion of sewer-air.† Some late authors recommend *two* traps in this position. Such a trap, or traps, should, when possible, be outside of the house, and accessible for inspection. This accessibility, it may be here remarked, should be provided for in the construction of *all drains and drainage-pipes whatever.* A plan of the house plumbing and drainage should be made when it is built, and kept for reference at any time. The absence of such a plan may sometimes cause great inconvenience and damage. In a house

* From Ough's Hints on House Drainage, London, 1879.

† Waring (*Atlantic Monthly,* July, 1879) advises the addition of mechanical arrangements to all water-seals. Such, however, are very apt to get out of order and disappoint expectations. Where storm-water is excluded from sewers, and they are ventilated, Waring (*Sanitarian,* December, 1879, p. 533) approves of the *omission* of the trap at the foot of the soil-pipe. This principle is now carried out in the drainage system at West Point; but it does not appear to be safe with ordinary city sewers.

known to me, rented out by an owner who was absent in Europe, the need of such a plan was strikingly shown. An odor near the centre of the house gave rise to repeated investigations without much result, until a carpenter, led by other similar experiences, took up part of a chamber floor, under which was found a pipe designed to ventilate a privy just at the rear of the house. This pipe passed into the kitchen chimney; one of its joints had become leaky, and gave out foul air immediately

Fig. 119.



MISPLACED PIPE.

under the floor of the chamber, making it uninhabitable until the fault was remedied.

House-drains running under or upon the ground should be made of salt-glazed earthenware. It is better for them to be made of iron, and suspended above ground from the lowest floor. If on the ground, they should be laid with great care upon a bed of concrete, or at least with

Fig. 120.

A LEAKY DRAIN.

good "clay puddling," and the joints secured with the best cement. Sinking of the ground under a drain, unless effectually provided against, may result in broken joints, with leaking of sewage under or near the house, saturating the ground in the most injurious manner. No drain should ever run *under* a house when this can at all be avoided.

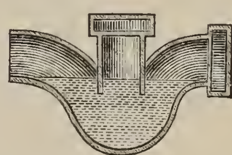
Next, *ventilation* must be supplied for all the house-drainage system. This is needed, first, for each trap; secondly, for the soil-pipe; thirdly,

for the drain or sewer into which all the house-drains empty. (Fig. 114.)

Every trap should be ventilated from the *top* of its *outer* bend. Its vent should not go into the soil-pipe or its ventilating-pipe, but should have a separate air-pipe. All the traps of the house, however, belonging to baths, lavatories, and cistern overflows, may be vented by branches connected with the same pipe, if this be quite disconnected with the water-closet system. The only satisfactory way to ventilate a soil-pipe is to *continue it* all the way up above the roof; best, to a height of ten or twelve feet above the eaves, and always in a direction clear of all windows. Rain-water pipes must not be used to ventilate soil-pipes or drains. When connected with these, they are of no use in this way during storms, and at other times, opening just at the eaves, they may, when so connected, take bad air into upper windows.

Some have recommended an *open* trap (covered by a grating) for ventilation at the *foot* of the soil-pipe. (See Fig. 121.) Better than this is an air-pipe, which need not be more than two inches in diameter, *ascending* from the foot of the soil-pipe to or above the highest part of the roof. This U-shaped arrangement of soil-pipe and foot ventilating-pipe together has been found to work extremely well. A patent has lately been taken out for the use of a ventilating-pipe for water-closets apart from the soil-pipe; but there is excellent reason for believing this patent to be invalid.*

Fig. 121.



For additional air-protection, a small vent may pass from the water-closet immediately *under the seat.* This must *not* enter the soil-pipe or its ventilator, but it may quite safely be led into and carried up through the flue of the kitchen chimney. Ventilation of a soil-pipe directly into the kitchen chimney is sometimes arranged for, but it is not advisable. Downward draughts (particularly when, for a time, the fire is out) may mingle impure air from the soil-pipe with that of the kitchen. If the ventilating-pipe goes *through* the flue and up *the whole height of the chimney*, there is no considerable risk of harm. As a rule, however, no pipe containing foul air should be allowed to go *through* a house when it is possible for it to ascend or descend *outside* of the house. The chance of leaky joints within a house is too serious to be permitted when avoidable. If there be such a pipe carried through a house, it ought to be of metal (preferably enameled iron), not of earthenware,

* Hellyer's Dulce Domum advised this plan very clearly in 1877. See the *Sanitary Engineer*, Nov. 15, 1879.

or, worst of all, of wood. Arrangements intended to promote a healthy state of things may sometimes, through unskilfulness or negligence, have the very opposite effect. At Sandringham Palace, a residence of the Prince of Wales, a mistake was committed of this sort. The vent of a water-closet, under the seat, above the trap, was made to enter the soil-pipe, thus giving full opportunity for the air from the latter to return into the open basin of the closet and the room around it. This error is shown in Fig. 123. The plan exhibited in Fig. 122, of ven-

Fig. 122.

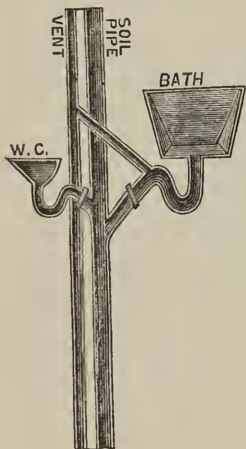
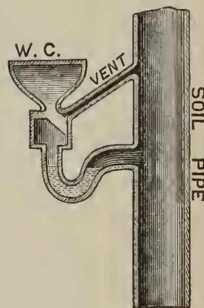


Fig. 123.



tilating a bath-escape trap and a water-closet trap by the same pipe, is not perfect; although it is much better than some methods in common use.

Experience shows it to be unwise ever to have a water-closet immediately communicating with a bed-chamber. The length of time spent in sleep, often without much renewal of the air, and, it seems probable, a greater susceptibility than in the waking state to depressing causes, makes the danger of blood poisoning greater under such than under any other circumstances, if contamination of the air exists. When a water-closet is not well supplied with window-ventilation, this may be supplemented, or in part substituted, by a pipe going upward through the roof, under whose expanded lower opening a small jet of gas is kept constantly burning.*

So far, we have considered the ventilation of traps and soil-pipes only in view of their air-purification. But there is another occasion for it.

* The topic of *downward* ventilation of water-closets and latrines by adjoining heated air-shafts belongs to *Hospital Hygiene.*

When two or more traps, one over another, connect with the same soil-pipe, the discharge from an upper one may, in passing downwards, suck (or "syphon") out the water which seals a lower one, and thus leave it empty. This, of course, allows the ascent of foul air, passing the lower trap; and such a possibility is not at all a matter of theory merely, but of frequent, actual occurrence. When air is admitted not only through the open end of the soil-pipe, but also by a vent above each trap, such a syphoning and unsealing cannot occur.

Supposing, then, that we have arranged to convey safely out of a house all its drainage: what are we to do with it?

First, in towns. Privy-wells ought never to be considered allowable, even in closely built villages, much less in populous cities. They cannot often—certainly they cannot generally—reach to flowing water, or to an entirely pervious sandy bottom. Therefore they will gradually saturate the earth, contaminating the "ground-water," and, in consequence, more and more, the ground-air. One fact in regard to air-movement we have not yet alluded to; namely, that, in all but the warmest months of the year, the *whole* of an inhabited house, and, *through* the year, that part heated by the kitchen fire, is, on account of its warmth being greater than that of out-of-doors air, drawing, sucking in air from the surface of the ground, and from the ground itself around it.

Thus "sewer-air" (which, properly speaking, means all air spoiled by human waste) finds access to houses whose interior arrangements are, in themselves, without fault.

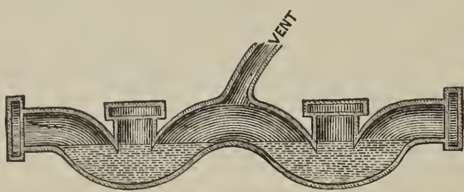
If this be true, so long as the earth-closet system, or nightly removal by a *pail* system (both very good, but not yet made convenient for large communities in this country) cannot be maintained, we have no resort but connection with the common sewer. Opposition to this has grown out of numerous cases of harm done by the escape of sewer-air into houses through defective plumbing. But no bad plumbing should be allowed; * and the air of the largest sewers may be kept innocuous by proper construction, good slope, ample water supply, and ventilation. We cannot enter, in this volume, upon the topic of city sewerage; but it may be said, at least, that the old style of immense square-built brick sewers is an abomination which ought now nowhere to be tolerated. If made round, or egg-shaped (with the small end downward), of a size not large enough for stagnation, and of impermeable material, properly

* Municipal inspection of all houses when built, and afterwards when reasonable complaint occurs, is one of the needs of our great cities. Tenement houses in New York are now subject to it; and surely the rich ought to have at least *as much* protection as the poor.

cemented at the joints, they will need then only abundant flushing and numerous air-vents to make them safe throughout. In Croydon, England, the first construction of sewers was followed by an increase of typhoid fever; but after the sewers were well ventilated, the disease disappeared almost altogether. Yet the connection of house-drains with town-sewers must be very carefully guarded; the *double trap* (Fig. 124) with screw-plates for inspection and a ventilating-pipe, being now the most approved arrangement.*

In country houses, whose owners can afford carefulness for health's sake (and who, that lives in a house of his own, can not and ought not?)

Fig. 124.



the same essential principles are applicable as in city residences. The most common method of rural house-drainage is, to convey waste underground to a cesspool, at a variable distance, the greater the better, from the house. By a cesspool† is generally meant a large and moderately deep well, which, if used, ought to have a removable cover for examination and emptying when needful. It is, with advantage, divided into two parts by a grating, separating solid from liquid waste. A good way of preparing the former, at proper intervals of time, for cleaning out, is to throw over it a quantity of earth. This makes its removal less unpleasant, and affords by the mixture a very serviceable manure. The liquid portion may be directly applied to the ground; best by irrigation through sub-surface tile-pipes, open at a portion of their joints to allow of the escape of the drainage into the earth. For this use, Waring speaks very highly of Field's flushing-tank, as answering, under experience, admirably, for fertilizing a garden or cultivated field.

There are some situations which do not admit of any such distribution of waste material; for instance, at the sea-shore; where hundreds

* Of course the *slope* of every drain, after it reaches the ground, is of great importance. One inch to the yard will afford a sufficient descent under ordinary circumstances. Very many drains have a good deal less than this; and not a few have been found, under careful inspection, to *slope the wrong way*. See Teale's Dangers to Health; and Report of Massachusetts Board of Health, 1879, p. 94.

† In Scotland, this word is said to mean simply a trap.

of cottages, as well as boarding-houses for summer occupation, sometimes spring up in a single season. At Ocean Grove, New Jersey, during the first two or three years of its settlement, driven wells for drinking-water, and other wells for house-wastes, were dug side by side, on small lots, not many feet apart. The sandy ground permitted an easy mingling of waste and water-supply in the common ground-water of the place. As a consequence, almost every person who visited the locality went through a seasoning, or acclimating, diarrhœa, which, especially with young children, involved sometimes quite a serious illness. Fortunately, the Ocean Grove Association, becoming aware of the increasing contamination of their ground, took judicious measures for its protection. All waste-wells were made (as nearly as possible)

Fig. 125.

HOW PEOPLE DRINK SEWAGE.—(Teale.)

water-tight; and, under strict regulation, they were all periodically cleaned out at sufficiently short intervals to avoid atmospheric contamination. A resident of the place informed me that the local diarrhœa at once disappeared under these appropriate improvements. Other watering-places have been known to suffer great disadvantage from analogous defects, not always ascertained until after they have cost some lives of visitors who had sought them as sanctuaries of health.

For the evacuation of waste-wells and cesspools in town or country, but especially in cities, the "odorless pneumatic system," most largely carried out in Amsterdam by Captain Liernur, is undoubtedly a great improvement.*

After all, however, the *ideal* method is, the return of all human

* See Waring on Sanitary Drainage of Houses and Towns, N. Y., 1878; p. 284.

waste, as soon and conveniently as possible, to the ground. Nature's own disinfectants are the *earth* and *growing plants.* Together, these are perfect in their action; and they admit, satisfactorily, of no substitution. Nor need any one be afraid of this effective transforming process, this alchemy of nature, when sewage passes *through* (not lying stagnant upon) the soil on which there is abundant vegetation. The Craigentinny meadows, near Edinburgh, derive their luxuriance from sewage irrigation. At Clichy, near Paris, five thousand acres of barren sand were, by the sewage of Paris, converted into fertile fields and gardens. A manufacturer of perfumes chose this favored spot for the culture of his aromatic herbs. The finest mignonette of Covent Garden market, London, has long been grown upon sewage-watered soil. Among the *Alpes Maritimes,* ground fertilized chiefly with waste of human habitations produces, for the use of the perfumers, an abundance of roses and violets.

"Do you know," says Victor Hugo,* "what these piles of ordure are, collected at the corners of the streets, the frightful barrels of the night-man, and the fetid streams of subterranean mud which the pavement conceals from you? All this is a flowering field; it is green grass; it is mint and thyme and sage; it is game; it is cattle; it is the satisfied lowing of heavy kine at night; it is perfumed hay; it is gilded wheat; it is bread on your table; it is warm blood in your veins; it is health; it is joy; it is life. Restore this to the great crucible of the earth, and abundance will issue from it, for the nutrition of the plains produces the nourishment of men."

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* Les Misérables.

DISINFECTION.

The very best of all disinfectants, outside of the ground itself, are *fresh air* and *pure water*. Thorough cleanliness prevents all occasion for processes of correction; and such prevention is infinitely to be preferred to any and all such processes; for, indeed, perfect disinfection is, in regard to the causes of some of the most dangerous diseases, hardly possible, except by the powerful influence of heat.

Almost every one now knows that odorous substances, such as cologne, do not disinfect, or even improve the air, as to healthfulness; they only conceal or disguise the evil. If any beneficial agency can be obtained by such materials, it is to be had by *burning* aromatics, as myrrh, cloves, etc., or coffee. The latter will at least remove the unpleasant smell from a room in which the air is unavoidably affected by a bodily disorder of a person confined within it. Frequent changing of the clothing or covering of such a one, and burning or boiling every article that is soiled, are very important. No absorbent material should, when it can be helped, be kept in a sick-room, for the same reason. Bed-curtains, window-curtains, wall-papers, and even carpets, are subject to this objection. Especially, also, everything passed from the body should be covered at once, and removed as soon as possible.*

Agents called disinfectants may act in several ways:

1. Those called *antiseptics* prevent or arrest putrefactive decay in animal and vegetable matter. Sulphate of iron and chloride of zinc are examples of this kind of action.

2. Some substances, as charcoal and lime, *absorb* gaseous emanations from decomposing bodies.

3. Others act chemically upon the results of decay, so as to make them harmless. One of the most common, unpleasant, and injurious of these resultant products is sulphuretted hydrogen, whose odor is that of rotten eggs. Against this, chlorine (in the form of chloride of lime or solution of chlorinated soda) is very effectual; and so, also, when applied to quantities of liquids, is solution of nitrate of lead.

4. Most important, but most difficult, is the destruction of those special and subtle causes of disease, to which, because many facts make it probable that they are minute living organisms, the term "disease germs" is commonly applied.

Air is *much improved* in healthfulness by taking out of it sulphu-

* An uncovered chamber-vessel under the bed is an intolerable barbarism at all times.

retted hydrogen and other odorous products of mere decay. It may, however, still have left in it the contagion of small-pox or scarlet fever; the local infection of yellow fever; the miasm of autumnal remittent; or the migrating cause of epidemic cholera. To annihilate these requires a total change of the atmosphere, as well as of the surfaces exposed to it—such as can be effected only on a comparatively small scale; as, within a house, a railroad-car, a steamboat, or a ship.

Without dwelling longer on these generalities, we may briefly enumerate the most serviceable of disinfectants.

The cheapest (besides dry earth, referred to in our last chapter) are *quicklime*, *charcoal*, and *tar*.* These are all very effectual—in privies, for example. All of them, however, make some deposit, which must be remembered in regard to traps, etc., where it will not do to allow accumulation. But such things have very little action on the *air*, except, it is true, when quicklime or charcoal is spread or suspended in different places within apartments. Whitewashing walls, as in cellars and kitchens, is an excellent means of "sweetening" them, which ought to be repeated often. We want, however, not unfrequently, to purify the already contaminated air of a house. For this, the two most powerful agents are *chlorine* and *sulphurous-acid* gas. The first of these was once regarded as the only valuable disinfectant; now, under a sort of reaction, it has come to be, with many persons, underrated. Not only will chlorine decompose sulphuretted hydrogen gas, but it will, when enough is used, also destroy *bacteria*† (the best known of minute organisms present in decaying matter); whence it may be expected to aid in the destruction of all disease-germs. But, to secure this effect, a great deal of it must be used. In a very bad state of the atmosphere, the affected rooms had better, instead, be cleared of all human beings, and fumigated with burning sulphur. For every thousand cubic feet of space, a pound and a half of sulphur should be burned,—best over a pan of water, or a vessel containing sand, to avoid the danger of fire. No one can breathe sulphurous fumes with safety. The doors and windows of rooms to be so disinfected must be closed for several hours, and then thoroughly aired before being again occupied.

Cold arrests putrefaction, and so lessens the activity of contagions and infections; but it does not destroy them. *Heat* (from 200° to 250° Fahr.) is the most effectual of all disinfectant agencies—the only perfect one. It will destroy all "disease-germs," and break up or drive

* A pint of tar, used once in a week or two, will deodorize (except with a slight odor of its own) a large privy-well.

† See the *Dublin Journal of Medical Science*, September, 1879, for an account of recent experimental proof of this by Dr. Notter.

off all unwholesome emanations from whatever source. It is not, however, easy or convenient to apply high heat continuously to private houses, and it has been mostly so far reserved for especial emergencies. Clothing exposed to any infection or contamination ought (if not bad enough to be burned) to be well boiled before being used again.

The disinfectants most commonly approved for practical use are the following:

For privy-wells or water-closets, a solution of copperas or green vitriol (sulphate of iron) may be made by diffusing ten pounds in a bucketful of water. Of this, the whole, or more, will be required to disinfect thoroughly a bad privy-well. For a bed-pan or chamber-vessel, a teacupful of the same solution will suffice each time the vessel is used. Or, for the last-named purpose, a solution of chlorinated soda may be employed, a fluidounce to a quart of water; or crude permanganate of potassium, ten grains to the quart of water.

Carbolic acid, not long since, was lauded and trusted above almost all other disinfectants. Careful experiments have shown that it is merely an antiseptic of moderate value, with very little power to destroy bacteria or other minute organisms. This being the case, its extreme disagreeableness may well justify its being generally disused in private houses.

Chloride of lime may be safely and advantageously employed in cellars or other places where the air is not good, being placed in shallow vessels to give off chlorine gas. Vinegar, added to it, will increase its efficacy, which will not in any case last long. A *solution* of fresh chloride of lime in water will answer well to deodorize and disinfect privy-wells. Its action on metals makes it unsuitable for water-closets, kitchen-sinks, etc. Chloride of zinc has similar antiseptic properties, but does not (unless with some other chemical agent added), like chloride of lime, give off free chlorine gas.

Burnet's liquid is a solution of chloride of zinc. Labarraque's liquid is a solution of chlorinated soda. Bleaching salt is chloride of lime. Condy's liquid is a solution of permanganate of potassium; Ledoyen's liquid, solution of nitrate of lead; chloralum (a very good disinfectant), solution of chloride of aluminium. Of less certainly known value are a number of recently advertised preparations, many of them patented, which are extremely unlikely to do so much good as those above mentioned.*

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* The following statement of the results of some recent experiments with disinfectants is from the Philadelphia *Medical News*, 1883: "Nedwetsky proved, as far back as 1872, that cholera bacteria were not killed by quinine, camphor, carbolic acid, calomel, or chloral; that opium, nux vomica, and chloroform destroyed them very

Standard Disinfecting Solutions Recommended by the Pennsylvania State Board of Health.

No. 1.—Dissolve chloride of lime or bleaching powder of the best quality in soft water, four ounces to the gallon.

No. 2.—Dissolve corrosive sublimate and permanganate of potash in soft water, two drachms of each salt to the gallon. This solution is highly poisonous. It requires a contact of one hour to be efficient. It destroys lead pipe. It is without odor.

No. 3.—To one part of Labarraque's solution of hypochlorite of soda add five parts of soft water.

No. 4.—Dissolve corrosive sublimate in water in the proportion of four ounces to the gallon, and add one drachm of permanganate of potash to give color to the solution as a precaution against poisoning. One fluid ounce of this solution to the gallon of water is sufficiently strong.

Above all things, however, it is to be remembered that *non-infection* is a thousand times better than *disinfection*, and absolute universal cleanliness would insure this. The time will no doubt come, under the advance of knowledge and true civilization, when no cholera will traverse the globe from the rising to the setting of the sun, and no yellow fever will put whole cities in mourning for their dead. As the plague has, even in the East, became a rare instead of a frequent visitant, not now, as once, invading European cities, so other terrible scourges of mankind may, and no doubt will, in time be overcome by *sanitary prevention*. In order for this to happen, every man must be the guardian of his own threshold; not only for his own advantage and safety, but also for the "common weal."

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slowly, while the dilute acids, sulphuric, nitric, and muriatic, decompose them very quickly, as did tannic acid, sulphate of iron, and chlorine water; also corrosive sublimate, bromine, and iodine. But perhaps milder remedies may have the same effect; at least one per cent. of tartaric acid will kill the yeast plant, but allow bacteria to thrive, while a five per cent. solution will allow mouldy growths to appear; or a stronger solution will kill both these and bacteria. It is known that yeast plants, moulds, and bacteria feed upon each other, but that bacteria will destroy or eat up all the others. One part of corrosive sublimate in 20,000 of water will kill bacteria in ten minutes; 1 part in 5,000 is a certain disinfectant, and of course as safe as stronger solutions of the milder tartaric acid. But sulphurous acid, generated by burning sulphur, which is the most commonly used disinfectant, requires thirty minutes to kill bacteria, and their spores will sometimes live for ninety-six hours. A five per cent. solution of carbolic acid requires twenty-four hours, and a three per cent. will not kill them at all. A five per cent. solution of chloride of zinc requires one month, and they have even been found alive at the end of that time. Iodine, 1 part to 5,000 of water, destroys them; and bromine, 1 part to 1,500 of water. The oils of mustard, peppermint, turpentine, and cloves, even in dilute solutions, have a restraining influence upon bacterial development."

POPULATION.

Already, in the early part of this book, some facts have been given, showing a close relation between the mortality of places and the number of people aggregated together. Other facts of a similar kind abound. With more space, I might describe (were they not too horrible) the unwholesome conditions under which some thousands of people live, not only in China, India, and Egypt, but in Europe and America. We might dwell on the habits of the Icelanders, of whose children the greater part die during infancy; or on the crowding in Naples and other continental cities of Europe; or on that of London, where, says the *British Quarterly Review*,* at least one-half of the houses are unfit for human beings to reside in; or, nearer home, on those evils still existing in some American cities, which make it remarkable not that yellow fever visits them, but rather that it ever spares them at all. Enough for our purpose to glance at two or three very sad but instructive examples. One of these may be a town on the naturally healthful island of Malta.

Plimpsoll, the well-known English philanthropist, has been recently investigating the sanitary condition of Valetta, where the poor population live chiefly in cellars. He says of these cellars or pits:

"They have no fireplace, and therefore no chimneys, and serve singly for a whole family—man, wife, and children. They have no windows, and some have no other aperture of any kind than the door; and when you have reached the bottom of the well you find the floor, the solid rock, wet with urine and foul with the odor of the children. So little air reaches the bottom that the floor of the yard or well never dries, and so little light that when you are asked to enter and stand in the doorway, it is dark as pitch, and you have to light a wax match to avoid falling down the two or three steps within the doorway. . . . The excrement in many of them is put into a box over the sewer, about twenty inches square and high. It goes right down into the untrapped sewer, and there accumulates in the dry season, unmixed with ashes or dry dust of any kind."

In one of these filthy dens, under a handsome house in the Strada Maza Muscetto, were found, in an area of 1,692 feet, three stories or tiers of six cellars in each, and in the lowest of all above thirty people were living, thirty-nine feet *below the level of the street*.

With such sanitary arrangements, the death-rate in 1874 was 49.24

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* April 1, 1879.

per 1,000 of population. It ought to be not more than 15 or 17 per 1,000.

Another case has been long familiar to readers of Carpenter's standard treatise on "Physiology."* The island of St. Kilda, one of the Western Hebrides, when visited in 1838, had an enormous mortality of infants, *four out of every five* dying. This was explained by the way of living of the people. "Their huts were small, low-roofed, and without windows, and were used during the winter as stores for the collection of manure, which was carefully laid out upon the floor, and trodden under foot to the depth of several feet. On the other hand, the clergyman, who lived exactly as did those around him, except as to the condition of his house, brought up a family of four children in perfect health; whereas, according to the average mortality, at least three out of the four would have been dead within the first fortnight."

But we need not go farther than the lately much discussed tenement-houses of New York for an exemplification of over-crowding and its destructive effects. Half the population of that great city live in 21,000 tenement-houses, and two-thirds of the deaths of the whole city occur annually among that population, mostly during childhood. Nearly half a million of people have allotted to them an average of less than seven square yards to each person. The tenement-houses are large, and often closely packed together, many rooms having no direct communication with the open air, and being never reached by a ray of sunshine from one end of the year to the other! So late as 1877, one such building (98 Mott Street) contained ninety-nine families, making in all nearly five hundred persons. Several families sometimes occupy a single room. It is not needful for us to say more in description of these dens of misery, upon which the blaze of modern sanitary inquiry has now been fully turned, so that philanthropy and civic prudence have united to abate their evils.

An extraordinary fact is, that the poorer portion of those brought up amid such circumstances are often *unwilling* to have them improved. They must be helped and taught gradually; they seem almost like owls or bats brought out into daylight, when any one attempts to better their condition. Says Dr. Stephen Smith (*Sanitarian*, July, 1875, p. 155): "The family reared in a cellar resists every effort to induce it to take rooms on the first floor. The struggle of the Board of Health to vacate cellars, and compel the underground population to live above ground, has been carried on with varying success for many years.

* Chapter on "Respiration," p. 545.

Again, we find a family always accustomed to a rear tenement will never take the front, and one always occupying a single room will be found averse to occupying two rooms."

Yet, when once an improvement has been made, they become aware of its benefits, and are brought to assist in their extension. In 1866 a reform was begun in New York, through which, according to Prof. Chandler, down to the present year, 13,000 lives have been saved.

By the aid of seaside homes for sick children, excursions to the country and on the water, free medical attendance and sanitary advice, this lowering of mortality in tenement-houses goes on more and more rapidly. In 1876, 3,060 deaths occurred amongst them from summer diarrhœal diseases; in 1879, 2,084—a reduction of nearly a thousand in this death-rate alone.

Besides some regulations referred to on a previous page, it is now enjoined, by the New York Tenement-House Law, that the space between floor and ceiling must be in every room at least eight feet. Every bed-room must have direct communication with the outside air, and six hundred cubic feet of air-space must be allowed for every occupant. When this last enactment comes to be fairly carried out among the hundreds of thousands now packed together with an average, in some blocks, of from one to two hundred in a single house, the sanitary millenium will almost have arrived. Now, upon two miles of Fifth Avenue, 400 families dwell in wealth and comfort. Less than two hundred yards from this elegant thoroughfare, a single block of tenement-houses has long contained 700 families, aggregating 3,500 souls. How much disease and how many deaths in Fifth Avenue may have been derived from such a block!

It has been shown that no skill or ingenuity can suffice to build a healthy and comfortable tenement-house of several stories for a large number of people upon a lot twenty-five by a hundred feet. The best that can be done with such lots is to erect upon them (*at most*, two or three on a single lot) small two- or three-storied dwellings of improved construction. This has been done lately in Brooklyn, each house costing about $1,100. These, at a rent varying from $13 to $20 per month, will produce a fair return to their owners. Upon this topic more will be said in our next chapter.

Boston, as well as New York, has long been overcrowded upon the tenement-house system; and some smaller manufacturing cities of New England have had of late an increasing excess of population. A committee of the American Social Science Association not long since reported that in Boston the average proportion is more than eight persons to a dwelling, some of the old wards having an average of eleven and twelve.

In Fall River it is between ten and eleven. In New York, according to the census of 1870, it was nearly fifteen persons to each dwelling; in nine wards, twenty-two. At the same time, Philadelphia had one house for every six persons, as the average for the whole city; while its worst wards had one house for every eight.* No wonder, then, that this city has been called the "City of Homes!"

* The actual number of houses in 1870 was, in New York, 64,440; in Philadelphia, 112,366. Population of the former city, nearly a million; of the latter, about 675,000. In 1876, by count of the police, there were in Philadelphia nearly 144,000 houses. In New York, by the State census of 1875, the number of dwellings was 67,126; population, 1,041,886; average for each house, 15.52. The average for each house during the same year in London was 7.8 persons. (See Report for 1878, by J. T. Nagle, M.D.; *Hospital Gazette*, Dec. 13, 1879.)

WORKINGMEN'S HOMES.

In Dr. B. W. Richardson's imaginary model city, *Hygeia*, a method is proposed by which the work of men and women may be kept quite apart from their dwellings. This separation is to be effected by the establishment of blocks of buildings expressly for the purpose; where, in appropriate rooms, the tailor, dressmaker, lacemaker, etc., may go through with his or her daily task, and return home when it is done. Day-nurseries, meanwhile, are to take care of the children while their mothers are away at work. This is carrying the co-operative principle very far; too far, probably, ever to meet with universal favor or success. But a certain degree of approach to it already exists in connection with many avocations; and the question of the maintenance of good homes for working-people has become one of the most pressing in sanitary and social science.

Naturally, most workmen wish to have their dwellings near their places of business, so as to save time, effort, and expense in going from the one to the other. With those whose occupations are sedentary, involving but little muscular labor, it is really better that there should be distance enough between home and work to secure some exercise in the open air in the morning and evening walk. But with those whose labor is prolonged and fatiguing, it is desirable that the home should be either near the place of work, or accessible by some cheap and rapid conveyance.

Workingmen's trains, with reduced fares, now run to and from several of the largest cities in England, and in our own country; and they are very useful. Horse-cars, in Philadelphia especially, render a similar kind of service, though with much less saving of time.

Where ground is greatly in demand for business purposes, it is impossible to get a good interest from dwellings upon it, unless they pay a high rent. If this rent is to be obtained from poor tenants, there must be a great many of them in one building. Other portions of large cities are usually rendered unavailable for homes for the working-class by the high prices growing out of social preferences for localities. After awhile, the valuation of health will prevail more reasonably than now, and then a town-lot on the highest and most open quarter of the city will command at least as good a price as one on lower ground, closely built with marble or brown-stone fronts, on a fashionable street. Such a comparative equalization of land-values may, before long, aid in making it practicable for capitalists, or well-to-do artisans on a smaller scale, to erect houses in good parts of the town, at a small or moderate ex-

pense—such as will be within the reach of workmen who must live not very far from city establishments.

But the best and highest aim always will be for every man to own his dwelling. Building associations admirably promote this result. Some of these, in London, have been started and managed by men of capital for the benefit of the poor. Others are truly co-operative. This is the character of those which have become very successful and useful in Philadelphia.

Ground-rents, irredeemable so long as the interest is paid, make the purchase of land for building more practicable. One who owns a small lot (say eighteen by ninety feet, on a fifty-foot street), on which there is a ground-rent, may join a building association, and by paying one dollar a month he may have opportunity to borrow from the association, at a moderate premium and interest, enough money to put up a small house. It may be of brick—fourteen and a half feet front (leaving a passage at the side of three and a half feet) and thirty-two feet deep. Thus, by paying dues, in all amounting monthly to about twelve dollars and a half, he is enabled, in eight, ten, or twelve years, to clear off his indebtedness on the house, and have it for his possession as well as his home. Multitudes of such two- and three-storied houses, with two (seldom three) rooms on a floor, and mostly owned by their occupants, are to be seen in rows and blocks in many parts of Philadelphia. George Peabody did an immense amount of good, by presenting a large sum of money for the erection of model lodging-houses in London for the poor; but much more advantage has resulted from this happy series of enterprises, which have made it possible for thousands to erect homes for themselves. Morals, as well as comforts, are thus often signally improved. Of course, philanthropists may and must, especially at first, assist and direct such reforms. Prince Albert was herein a truly noble example and leader. John Ruskin and Octavia Hill in London, the Board of "Trustees" in Glasgow, and the "Association of Physicians" in Copenhagen, have alike shown not only that the comforts and decency of the very poor can be thus greatly aided, but that vice and intemperance are thereby discouraged, and municipal order promoted—and all this without loss, indeed with a very fair return, to the owners on their investments.

Yet, alas, how many of the poor, in all our cities, still need to be lifted out of their squalidness and taught how to live! For these there is excellent training, as well as health-giving and much enjoyment, in the summer-days' excursions and the "country week."* In

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* This is an arrangement by which families living in the country receive, for a week or more at a time, children of the poor from the city. It is managed by a voluntary organization of benevolent ladies, who have reported excellent results from it.

the latter, especially, there is a rich combination of all these advantages. Show the unwilling but ignorant prisoner of Five Points or Alaska Street how the humble farmer or farm-laborer lives, in a neat and airy cottage among green fields, and he or she *must* be inspired with longings for something better for himself or herself, and for their offspring. The sights and odors of the fresh, open country will long live in the dreams of children who are taken out to be refreshed and revived by them; and then they cannot so easily afterwards be content without cleanliness, which is possible everywhere, and thus sweetness in the workingman's home. They will be better, safer, more patriotic citizens therefor; and so it is the interest, nay, almost the necessity, of every member of the wealthier class to aid and encourage all that can be done toward so important a reform. Even a single day's lesson in healthy living will help this much.

Six hours of sunshine! six bright hours of gladness!
Six hours of joy 'mongst grass, and flowers, and trees;
Six hours' escape from want, and woe, and sadness;
Six hours of butterflies, and birds, and bees!

That 's all they pray for; all these tiny creatures,
Stunted and squalid, ask of you one day,
To let God's breezes fan their wee, wan features,—
One day from their dark homes to get away.

One day to leave the fetid court and alley,
To breath pure air, to hear the wild bird's song;
One day to track the brook adown the valley;
One day!—Oh! say, my brothers, is 't too long? *

* From London *Truth*, 1879.

SEASONS.

What a wonderful influence upon the history of our earth is connected with the *tilt* of its axis to the path or orbit in which it moves around the sun! But for this, producing a difference of direction, and hence of heat, in the sun's rays, according to the part of its orbit in which the earth is at different times in the year, we should have no Spring, Summer, Autumn, or Winter; only a perpetual summer at and near the equator, and unchanging winter around both poles.

Our common division of the four seasons is somewhat arbitrary. With the ancient Greeks, Spring was made to consist of but forty-eight days; Summer, of one hundred and thirty-one; Autumn, fifty-one; and Winter, one hundred and thirty-five days. It is hard to realize, unless one crosses the equator, that people living in the Southern hemisphere have their summer at the same time with our winter, and their coldest weather when ours is hottest. On the average, January is our coldest month. North of 48° N. latitude, July is the hottest month; between that and the equator, the period of greatest heat is usually in August. A curious fact is, that the immense city of London has seasons of its own. Throughout England generally, the second week of January is the coldest time; in London it is the third week instead. Of the summer, the second week of July is the warmest; it is three weeks later in London.

Among three million deaths in different countries in Europe, it was found that the greatest number took place in spring. In the most Northern countries, and in Great Britain and Ireland, winter is the most fatal season. So it may be also in our Northern States and British America, outside of the *great cities*. In them, however (New York and Philadelphia, for examples), summer makes so many victims amongst young children as to turn the scale. The difference between the Northern and the Southern summer in this country lies chiefly in the *length* of the summer in the South. Quebec and Montreal have a few very hot days in their short summer; and some of those of July and August, in Cincinnati and Philadelphia, compare closely with the hottest of Charleston, Savannah, or New Orleans.

The highest temperatures in the *sunshine* reported anywhere (with a thermometer uncovered in the air) are 146° Fahr. at Bagdad, in Western Asia, and 150° in Thibet. Dr. Livingstone found it 136° in the sands of Sahara, in Africa. In Maryland, one August day, I found it 134° in the sun. 120° in the shade has been observed in India and Southern China, even *at night*. 40° below zero Fahr. has been known

within the limits of the Northern United States; —50° to —90° in the far Arctic zone. In Philadelphia, the range is from about 16° below zero, the coldest, to 101.5, the highest ever known.*

With regard to health, the year may be divided into the *colder* and the *warmer half*. In the colder months diseases of the breathing organs are most common: croup, bronchitis, pleurisy, pneumonia; also rheumatism, especially in old people; and complaints which are promoted by close air in houses, as small-pox, measles, diphtheria, erysipelas, typhus fever, etc.

Summer-time is most apt to bring with it affections of the stomach and bowels, as cholera morbus, diarrhœa, and dysentery; disorders of the liver; and fevers, as remittent, intermittent, and yellow fever. Typhus fever is (as above said) rather a winter disease; typhoid fever occurs at all seasons of the year. When exposed to cold, young children and very aged persons suffer most. It is not uncommon for old people to die in a very cold spell of winter weather.

Protection against extremes of heat and cold and sudden changes of temperature is indispensable to health. Nothing is more absurd than (as some people are said to do) to change clothing with the seasons by the almanac instead of according to the weather. More common and equally imprudent is putting out fires too early in the spring, and leaving their use till too late in the autumn. Many people are thus made sick. When rain falls and it clears up again, the out-of-door temperature in spring or fall may soon become mild; but, without fires, the dampness lingers within doors, and its effect is made greater there by sitting; while out of doors we are usually in more or less active motion.

Is it not a good thing to be *hardened?* Yes; but the way to bring it about is not always well understood. Severe exposure will not always harden; it may kill instead. The ancient Spartans had a custom of leaving young infants out on the bare ground over-night to try their natural hardiness. Some lived, others died; and so the State had fewer invalids and stronger soldiers to grow up. But the way to harden any one is to subject him often to *moderate* exposure, with enough protection to enable him to meet it without depression of the system. It does nobody any good to be really chilled or exhausted, even for an hour. It is with this a good deal as it is with credit in business. A man builds up his credit by meeting all his obligations as they occur, and by never incurring any indebtedness which he cannot meet. So we become hardier under exposure only when we can bear it without injury at the time.

* Sept. 7, 1881. Higher has been reported; but with doubtful accuracy.

Take the baby out, then, every day, even in cold weather; but put on it enough clothing to keep it comfortably warm. Let the boys and girls play out even in the snow; but don't let them sit with wet shoes and stockings after coming in. If a man is really *warm enough* in winter without an overcoat, let him do without it; but it is a great mistake to allow oneself to be chilled under a notion that to do so is more manly, or is hardening.

One of the dangers of midsummer is of *sun-stroke;* better called *heat-stroke,* because it very often occurs in the shade. On the sea, off the south of China, persons have died from heat on board of a close vessel *at night.* It is worthy of notice that heat-stroke is much more common in *cities* than in the country. Very seldom does a farm-hand have sun-stroke on the harvest field, or a cricketer during his active game.

Soldiers, in India or Egypt, have sometimes been struck down on the march. But there is no doubt that the *unhealthy atmosphere* of cities promotes it. So does *exhaustive labor;* and, most of all, *intemperance.* We shall have something to say about the *treatment* of heat-stroke in another part of this book. Enough here to mention that as *heat* is the *cause* of the attack, *cooling down* is the main thing in its management.

CLIMATES.

What is **climate**? It is the sum of all the conditions of a place which affect men, animals, and plants.

Causes of Climatic Differences.

Latitude, North or South of the Equator,	Outline of Coasts,
Altitude, above the sea-level,	Mountains, Deserts,
Nearness to the Ocean, Lakes, Rivers, etc.,	Prevailing Winds,
Oceanic Currents,	Rain and Clouds.

From these, or some of them, come, in every case, the following **elements** of climate:

Temperature, Moisture, { Annual Mean, Extreme Range, Mutability, — Atmosphere { Pure, or Malarious.

Every one is familiar with the effect of **latitude**; that is, distance north or south of the Equator. By a *tropical* climate we mean that of the region between the tropic of Cancer and the tropic of Capricorn. Arctic climate is that beyond the Arctic or Antarctic circle, near either pole. But latitude alone does not determine climate. Alexander Humboldt, the great German traveller, first marked out some of the curious curves made by *isothermal lines;* that is, those which on the map pass over countries having the same average heat through the year.

Altitude, height above the sea-level, makes a great difference always. For every 300 feet, we find it about one degree of Fahrenheit colder. So we may get a temperate, or even a cold, region in the neighborhood of the Equator, when we climb a high mountain there. Plants and trees flourishing on the upper Alps are like those of places far north of their latitude in low countries. The *snow line*, above which it never melts entirely away, is at 8,000 feet on the Alps; 18,000 feet on the South American Cordilleras.

The highest inhabited spot in the world is a Buddhist cloister, in Thibet, 16,500 feet above the level of the ocean. The highest dwelling of men in America is the post-house of Ape, in Peru, 14,367 feet. The city of Potosi, in Bolivia, with a large population, is at an elevation of over 13,000 feet. At greater heights, as 17,000 or 18,000 feet, mountain explorers have found it almost impossible to live for more than ten or twelve days at a time. One misses, at such elevations, the ordinary *pressure of the air*, to hold one together, so to speak. Some aeronauts, as Glaisher, Cox, and Tissandier, have gone up in balloons 20,000 (one account says more than 30,000) feet; but they have come

down again hardly alive. Two of three, in Tissandier's ascent, died from the sudden exposure to cold and rarefaction of the air. Very much less than this, of course, is the effect of rapid changes of climate in moving one's residence North or South; but people often suffer in health from this cause. Our great Arctic explorer, Dr. E. K. Kane, after having had tropical African fever in the Gulf of Guinea, impaired his health by voyages toward the North Pole. Many Englishmen lose their lives by going from their temperate climate to reside in tropical India.

Nearness to the Ocean moderates all climatic extremes. In cold countries the shore is warmer, and in warm regions colder, than far inland. Water absorbs heat more slowly from the sun than does the land, but also gives it out more slowly.

At Long Branch, Atlantic City, or Cape May, sea-breezes *appear* to be capricious and uncertain. So they really are, to some extent, as many causes interfere with their regularity. Yet there is a *law* about it, nevertheless. Nothing seems so uncertain as the winds everywhere. Yet our Signal Service officers at Washington can tell, seventy-five or eighty times in a hundred, when a storm is coming, and thus order cautionary signals at certain ports for hours beforehand. All this belongs to the science of *Meteorology*.

On the sea-shore one of the laws is this: while the sun shines through the long summer day, the land becomes very hot, and the ocean less so. Now air, as it is heated by contact with the earth, *expands*, and becomes *lighter*. Cold air is *heavier;* so the colder air of the sea-surface at noon presses over to the land, displacing some of the warm, light air on the shore. This gives us the *sea-breeze*. At night the land *radiates* heat into space, cooling off very rapidly; the ocean, slowly. A cool breeze (land breeze) moves then from land to sea. As has been said, various causes (too complicated for us to consider here) disturb this enough to prevent it from being constantly observed; but it is the general rule.

What happens thus every day and night at the brink of the ocean, some regions have, instead, in six months' periods. Southern India, for example, has its *monsoons;* winds blowing half a year one way (nearly from the north), and the other half in the opposite direction (almost from the south). Winter and summer mark these changes. But this subject belongs a little farther on.

Lakes, when as large as our great Superior, Michigan, and others, which are little seas, have an effect in *moderating* climate like that of the ocean; but less in degree. The perfection of water influence is found upon *islands;* even when as large as Great Britain.

Moisture is, of course, another quality of the *insular* climate; not necessarily very much rain, but dampness in the air, and cloudy skies. Cowper, patriot as well as poet, recognized this as true of England:

> "Though thy clime
> Be fickle, and thy year most part deform'd
> With dripping rains, or wither'd by a frost,
> I would not yet exchange thy sullen skies,
> And fields without a flower,* for warmer France
> With all her vines; nor for Ausonia's groves
> Of golden fruitage, and her myrtle bowers."

On the continents much differenee is made by the **coast-lines**; whether they are much *indented* with bays, gulfs, and inlets, or smooth, round, and almost uniform in contour. In the first case, the water has access farther into the land, and the climate is moderated by it. Africa, for example, has a comparatively even outline all round; Europe (as the map shows at a glance) is indented and cut into on every side. Europe has, therefore, a *moderate*, **maritime** climate; that of Africa is **continental** and extreme. Asia has also a continental climate, its areas being so vast; but that of Hindostan and Cochin China is maritime through their peninsular outjutting into the sea. **Oceanic** is the best term to apply to our own continent, on account of its situation; North and South America stretching far along between the Atlantic and Pacific Oceans. But so much land lies, in North America, in a cold, almost Arctic, region, that its chill winds sweep down and undo much of the moderating effect of the ocean. Our American climate is, beyond most in the world, **changeable.** It is also, in the Northern States, extreme, having cold winters and hot summers.

Mountains make often a difference between two neighboring lands in warmth and moisture. Alpine travellers meet sometimes with a ridge which has on its north side almost perpetual snows, and on the south side evergreen woodlands; lower down, pasture lands. A pretty sight it is in spring, when a company of peasants ascend to these with their cattle, sheep, or goats, to spend the summer among the higher nooks of verdure, from which they retreat again at the first warning of winter. Here and there, by turning around the edge of a cliff, you may pass from a green, warm spot, with its gentians, Alpenrosen, and other flowers, to a bleak, icy scene like a bit of Labrador.

Moreover, moisture is *condensed* on the side of a mountain (especially near its top) and falls in *rain*. Thus, the side towards the sea comes to be well watered; while the wind, stripped of all its vapors, passes on,

* So only in winter, however.

with nothing to enrich the landward side. Westward of the Andes, a part of Peru is *rainless* for this reason. Not *eastward*, there; why so, we shall see presently. East of our Rocky Mountains there is an American desert also; *bad lands* those regions are very well called.

All the world knows that Egypt, south of the Delta, is a rainless land. Not mountains there (for there are none) but great deserts on each side drink up, so to speak, under the almost equatorial sun, all the moisture of its eastern and western winds.

Here again is a *law* of Nature. Air holds moisture, more or less, according to its *temperature*. As you squeeze a sponge, and thus rid it of its water, so chilling the air makes it deposit its moisture. Every night the *dew-fall* takes place in this manner. Radiation of heat into space, in the absence of the sun, cools the earth. The dew is simply moisture laid down by the condensation of atmospheric vapor. Some things have more dew on them than others; it is because they radiate heat more freely. Did we say that dew falls every night? This is not quite true. Clear nights have the most of it; since, then, nothing checks the outgoing of the heat of the earth into space. On cloudy nights, the blanket of clouds keeps the earth warm, as it were, returning a good deal of the radiated heat, and on such nights there is often little or no dew.

More moisture is in the air at some times and places than in others. Rainless regions are (almost) dewless also. The *dew-point* of meteorologists is the degree at which the mercury in a thermometer stands, when, on something which is cooled down gradually, moisture begins to be condensed. On a hot day, you may see a glass of ice-water "sweat" with such condensation.

On the other hand, when the air is *dry*, it will *take up* moisture from any wet surface, by evaporation. So we can estimate the humidity (dampness) of the atmosphere by the "wet and dry bulbs." That is, take two thermometers, exactly alike, and place them near each other. Then, keep one of them *wet* with pure water, and leave the other dry. If the air is full of moisture, the mercury will stand about as high in one as in the other. But if it is very *dry*, evaporation from the wet bulb will *cool it down*, so that the mercury in that thermometer will fall several degrees below the other. According to this *difference* is the conclusion reached about the dryness or dampness of the air at that time and place. Sometimes this method is used, and sometimes "taking the dew-point," as above mentioned. In a damp air, the dew-point is high; in a dry place and time, low. England has a high dew-point generally; Egypt a very low one. In our climate, it varies very much.

Here are some examples of *relative humidity* (100 being saturation) in different places. Jacksonville, Florida, during the five colder months of the year, averages 68.8; Washington, D. C., through the year, 68.15; Philadelphia, 68.5; St. Paul, Minnesota, 71.3; Mentone and Cannes, in Southern France, 72.4; Key West, Florida, 76.8; Atlantic City, N. J., 78.1; within Mammoth Cave, Kentucky, 87.6. Probably the most agreeable and desirable mean relative humidity is about 68.

The *barometer* shows variations in the *pressure* of the air, which is affected by moisture or dryness, but by other causes also. Other things being equal, *low barometer* attends dampness of the atmosphere; but this may be modified by the temperature, etc. At sea, a rapid fall of the mercury in a barometer generally portends a gale. The lowest barometer of which I have found record was during a typhoon in the Chinese Sea, in September, 1869, 27.62 inches; the highest was observed at Milwaukee, Wis., in January, 1866, 31.23 inches.

Comparing Great Britain and Ireland, in regard to climate, with parts of North America in the *same latitude*, we find a considerable difference in temperature. In fact this is true all the way along the west side of Europe, as compared with the Eastern States of North America. Philadelphia has an annual mean temperature of 52° or 53°; Naples, in about the same latitude, 62° Fahr. From Norway to Spain and Portugal, Europe has a milder climate.

This is easily explained. The *Gulf Stream* accounts for it. By it we mean that great **ocean-current** which navigators have known ever since Columbus dropped into it with his three ships, and thus got across the Atlantic, as otherwise he might not have done. Another week of sailing without land, and then his sailors would probably have thrown him overboard, and reversed their course. Moving *westward* from the African shores, this majestic current sweeps across the Ocean. Reaching the northern coast of South America, it enters among the West India Islands, penetrates between the North and South continents as far as the Isthmus of Panama, and there *rebounds*, so to speak, in the Gulf of Mexico. Thence it comes out (taking its name from that gulf) and moves *eastward* to the north of the path by which it arrived on our shores. North-eastward soon becomes its main direction; and, with waters warm from the tropical south, it beats upon the coasts of Ireland, making it the "Emerald Isle;" upon England, Wales, and Scotland, giving them a softened winter, never wholly desolate; and upon France, Spain, and Portugal—all lands of vines, olives, and flowers, gifts of its bestowal.

For, prevailing **winds** have a similar course to the ocean-currents to a great extent. We have seen how at the shore a "sea-breeze" com-

monly blows at noon-day from the cooler ocean upon the hotter land, this being reversed at night. Now, in Hindostan, when it is summer in Asia, all the land becomes warmer than the Indian Ocean, south of it. For half the year, therefore, there blows the *southern monsoon*, a strong wind *towards the north*. Then, when it is *winter* in Asia, the *northern monsoon* blows from the colder Indian lands towards and over the warmer Southern Sea.

The *trade-wind* is that which blows almost steadily from east to west in the equatorial regions of the earth. As the lands near the equator receive the most direct rays of the sun, they are always hotter than the polar regions. Therefore (as already explained), from the cold Arctic and Antarctic zones cold, heavy air moves towards the middle tropical belt; that is, from the North Pole southward, and from the South Pole northward. But the world is *rotating on its axis* from west to east; and as the outer rim of a wheel moves around much faster than does its hub, and at its centre there is no motion at all, so the rate of movement is much more rapid at the equator than near the poles. Winds blowing towards the equator are therefore *left behind* by the onrolling mid-earth; the effect of this being the same as if the earth was still, and the wind blew from east to west along the equator. This *westward* wind is the *trade-wind*.

Meeting the continents in its course, it is made to vary considerably; but it is the *prevailing* wind of the *tropical regions*. Brazil has such a wind, bringing from the Atlantic the moisture which makes for it a forest-growth, the most luxuriant in the world. But this wind, striking the Andes, is robbed of all its vapor, and thus Peru, *west* of the mountains, is (as before said) rainless.

Since air, like water, seeks its own level, there are *return* winds attending the trade-wind, one north and one south of the tropical region; blowing, the one north-eastwardly, and the other towards the south-east. It is the *return* wind that passes the Rocky Mountains of North America, and, being thus stripped of moisture, makes a barren land on the *east* side of those mountains.

Both the Gulf Stream and the return (anti-trade) wind, then, conspire to make the crossing of the Atlantic from the United States to England or Ireland shorter in time than that from England or Ireland to America, in the same latitude.

In the Pacific Ocean the equatorial current and trade-wind move westward, as in the Atlantic. There is also a return ocean-current, the Kuro-Siwo, and a return wind, going *from Eastern Asia* over to *Western North America*. Thus Alaska, like Western Europe, has its coast climate softened very much. As a rule, it may be said that in both

hemispheres *the western sides of the continents are warmer than their eastern shores.* For the same reason, they are more moist and better watered.

KINDS OF CLIMATES.

	Annual Mean.
Torrid	80° Fahr.
Warm	65° "
Mild	60° "
Temperate	50° "
Cold	40° "
Frigid	32° "
Polar	0° "

Perhaps the hottest torrid climate in the world is that of Thibet, in Southern Asia. There at mid-day the sun may raise the thermometer to 150°; yet at night the earth cools down sometimes as low as the freezing-point. Other torrid lands are Senegal, Guadaloupe, Persia, and Southern Africa. In Cape Colony the summer heat in the shade may reach 105°. Syria, Arabia, Egypt, the Isthmus of Panama, Guiana, Columbia, Brazil, and Paraguay are all hot countries. In them (except Egypt) there is a *rainy season* of about five months' duration. North of the equator, near the tropic, there is usually a spring-like season from November to February; then, from February to May, the *dry* season; from May to July, variable, with storms; and from July to November, the rainy season.

The highest summer heat in the United States, 113° in the shade, occurs in Texas, and near Fort Yuma, in Southern California. 107° has been noted at St. Louis; 103° at Washington; 100° in Philadelphia. The greatest extreme range is probably in *inland Alaska.* At Fort Yukon, the temperature reaches 100° in the sun during the summer, and falls to 50°, sometimes 70°, below zero in winter.

For the coldest temperature anywhere, one author (Cameron) asserts that 92° below zero Fahr. has been observed in 55° North latitude. Others mention —74° as recorded at Melville Island in the Arctic region. The highest latitude at which human beings live was found by Sir John Ross, an isolated tribe of savages (Eskimo) at 75° N. At Bangor, Maine, the thermometer has marked —40°; at Quebec and in Manitoba, still lower; Hartford, Conn., —20°; St. Louis, —18°; Philadelphia, —14° to —16°; possibly once —17°.

But the **extreme range** is not all that determines the character of a climate. Its changeableness, and the frequent *suddenness* of great changes in heat and moisture, make our American climate more trying to the health than that of Europe.

The amount of rain, the general dryness or dampness of the air, and the number of rainy and cloudy days, are all important. Taking Egypt and the rainless part of Peru as at one end of the scale, differences exist in various parts of the world, all the way up to the state of things in Vera Cruz, Mexico, where the mean amount of rainfall for a year is 183 inches; and where once, in 1857, 342 inches fell in 24 hours; Maranhao, Brazil, 280 inches; and Cherraponjee, in India, where in one south-west monsoon, 605¼ inches (nearly 17 feet) fell. Southern Australia, without many rainy days, has 92 inches of rainfall in the year. These great outpourings generally occur during a *season* of rain; the rest of the year in the same place may be almost without any. On the other hand, England, round about London, has an average of about 170 rainy, and many more cloudy, days in a year; yet the rainfall in Southern England is but 20 inches a year, not half of that of Philadelphia.* In the latter city our *rainy and cloudy days* are but a fraction of those of Southern England. The Lake country, in the northwest of England, has much more rain, and some 200 rainy days in the year. The Stye, a wild pass among the English Cumberland Mountains, is the wettest spot in Europe. Over 240 inches of rain have fallen there in a year. At Joyeuse, in France, 31 inches fell once in 24 hours; at Geneva, Switzerland, 30 inches in the same time; at Gibraltar, 33 inches in 26 hours. The average in France is about 30 inches; in the lowlands of Germany, 20 inches; certain parts of Russia have but 15 inches of rain in a whole year. Humboldt estimated the average for the equatorial countries as 96 inches.

For the United States, the extremes are a part of Louisiana, 68 inches, Oregon, 60 inches; and Fort Yuma, California, only 3 inches in a year, besides the almost or quite rainless region, a part of which is in New Mexico. In Alaska, there are about 200 rainy days in every year.

Comparing the Eastern and Western continents together, the tropical average in the Old World is (according to Guyot) 77 inches, and in the New World, 115 inches. In temperate climates, 34 in the Old World, and 39 inches* in the New World. Our Western hemisphere is the wettest side of the globe; and this makes it the *greenest* side also. Ours are the great forests of North and South America; the vast blooming prairies of the Western States; our Mississippi, Ohio, Hudson, Delaware, Orinoco, Amazon, and other magnificent rivers; and a productiveness which now sends grain and meat in abundance to feed the mother countries of the Old World.

Certain general facts or laws concerning rainfall are these: 1. It

* The average annual rainfall at Philadelphia for 57 years has been 45.19 inches.

† For every $\frac{1}{100}$ of an inch measured by the rain-gauge, a ton of rain falls on every acre of ground.

decreases in quantity from the tropics toward the poles. 2. It decreases as we pass from the seaboard toward inland countries. 3. It is less, in the *temperate* zones, on *eastern* than on *western* coasts; in the *tropics* it is the *reverse*. 4. More rain falls in mountainous than in level countries.

Can man *change* the climates of any of the regions which he inhabits? As to temperature, it seems, from long continued and recorded observations, that he cannot. In regard to rainfall, there is reason to believe that he can, and does, to an important extent.

In the Canary Islands, Syria, Persia, Belgrade, and Hauran, near Damascus, the destruction of forests has been followed by diminution of rain and consequent barrenness of the lands. When, at Belgrade, speculators were acting upon contracts to cut down all the woods, the reservoirs of Constantinople began to fail. Again, in India and Lower Egypt, the planting of large numbers of trees has been rewarded by increase of rain in those countries. A beginning of the same result has attended tree-planting along the edge of the "Great American Desert," east of the Rocky Mountains.

Forests, by their shade, prevent the too rapid heating and drying of the ground by the sun and winds. While they aid in draining an over-damp soil, they detain a large amount of moisture, which gradually finds its way to neighboring streams. Evaporation from the leaves of trees also goes on continually, and vapors arising thence are cooled in ascending, and fall in rain, instead of being carried away by the winds to a distance.

For a *large country*, such as the United States, the amount of rain falling has been shown to be nearly the same, taking a number of years together, through long periods; the difference made by the causation above mentioned extends to its *distribution* among the different parts of the country. Also, the destruction of forests makes the rainfall more *irregular*. Great droughts, followed by floods that wash away bridges and railways, even sometimes almost drowning villages or towns, are more frequent now in Eastern Pennsylvania and elsewhere in this country than they were fifty years ago. All through our States and Territories wasteful destruction of forests is going on. Very wisely, scientific and practical men, with encouragement from the government, are doing what they can to stop this, and to promote instead the planting of new trees in many places.

Excess of dampness in the soil of inhabited places promotes *malarial* and other *diseases*. To some extent, under-drainage can be used to improve such localities. Some kinds of trees help this in their growth. The eucalyptus, or Australian gum-tree, an extremely rapid grower,

has proved its value in this way by lessening greatly the unhealthiness of a part of the Roman Campagna. Our Southern Pine also is an excellent tree for natural soil-drainage.

What are the comparative effects of different climates upon living beings? The most favorable for *plants* in their highest and most varied development are the *maritime tropical climate* of the East India Peninsulas and Islands and the *tropical oceanic* climate such as exists in Brazil. Heat and moisture are the great fostering conditions of vegetation. Heat, unaided by much of the watery element, has somewhat, though less, of the same influence. Thus, in the Indies, says Guyot, in his admirable book ("The Earth and Man"): "What mighty, what admirable vegetation! We see at the same time plants with broad and numerous leaves, the excessive expansion of which is always the proof of an exuberant humidity; and those shrubs with concentrated and elaborated gums, those spices, those aromata, that bear witness to the dry and intense heat of the continent. There is the country of the mighty Banian, the symbol of vegetable strength. There uplifts its head the majestic Talipot palm, a single leaf whereof, sixteen feet broad and forty feet round, is enough to give shade to a score of men at once; and in the bosom of those virgin forests grow the largest flowers in the world, the Rafflesia, whose gigantic corolla alone measures no less than three feet across. There grow the cinnamon, the nutmeg, the pepper, and the cloves, which all civilized nations have fetched thence from time immemorial."

South America, east of the Andes, combines the warm and moist together in abundance. Let us again quote the same writer: "Behold, under the same parallel, where Africa presents only parched table-lands, those boundless virgin forests of the basin of the Amazon, those selvas, almost unbroken, over a length of more than 1500 miles, forming the most gigantic wilderness of this kind that exists in any continent. And what vigor, what luxuriance of vegetation! The palm trees, with their slender forms, calling to mind that of America itself, boldly uplift their heads 150 or 200 feet above the ground, and domineer over all the other trees of these wilds by their height, by their number, and by the majesty of their foliage. Innumerable shrubs and trees of smaller height fill up the space that separates their trunks; climbing plants, woody-stemmed training lianos, infinitely varied, surround them both with their flexible branches, display their own flowers upon the foliage, and combine them in a solid mass of vegetation, impenetrable to man, which the axe alone can break through with success. On the bosom of their waters swims the Victoria, the elegant rival of the Rafflesia, that odorous and gigantic water-lily, whose white and rosy corolla,

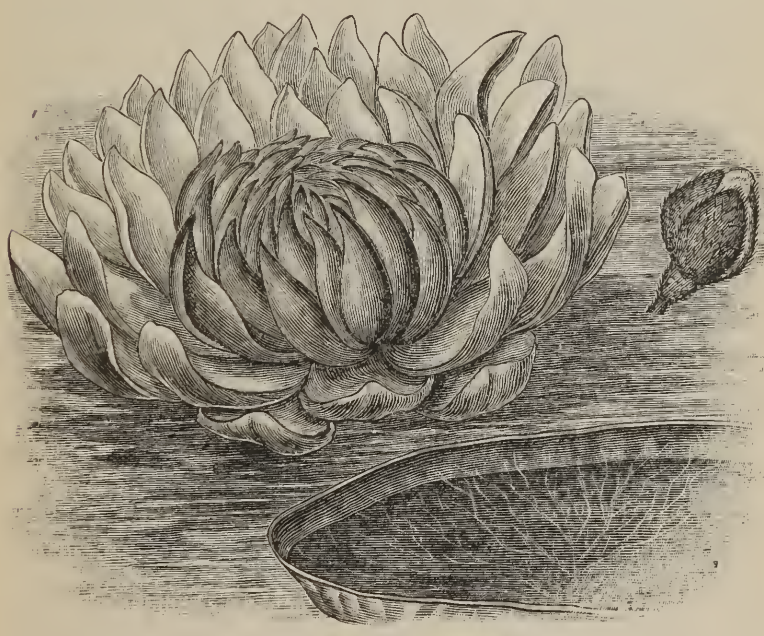
Fig. 126.

POISON-TREE OR UPAS OF JAVA, WITH THE FLOWER OF RAFFLESIA IN THE FOREGROUND.

fifteen inches in diameter, rises with dazzling brilliancy from the midst of a train of immense leaves, softly spread upon the waves, a single one covering a space of six feet in width. The rivers rolling their tranquil waters under verdurous domes in the bosom of these boundless wilds are the only paths nature has opened to the scattered inhabitants of these rich solitudes."

North America, outside of the tropics, displays a less lavish wealth of vegetative development. Yet, with forests, prairies, and well-watered lands, it has become, under cultivation, a land almost "flowing

Fig. 127.



VICTORIA REGIA.

with milk and honey." It has also its sky-pointing giants and wide-spreading trees: noble oaks, chestnuts, walnuts, maples, and, above all, the ancient and famous red cedars (Sequoias) of California. These "big trees" have, in their long-past prime, reached more than 400 feet in height, and some of them measure over a hundred feet around their trunks.

For animal life the same conditions, heat and moisture, are beneficial; but not exactly in the same proportions. A *continental* warm climate abounds most with the great beasts of the world. Asia and Africa

have native to them the Elephant, Rhinoceros, Hippopotamus, Lion, Tiger, Camel, Camelopard, Buffalo, and great as well as smaller Antelopes. America names as its largest species the Bison, Grizzly and Polar Bears, the Moose and Elk, Puma and Jaguar. Highest, in some respects, of all animals beneath Man, are the great Apes, Gorillas, Orangs, and Chimpanzees of the Old World. Our South American Monkeys and Marmosets are all inferior to these in size and intelligence.

But, in the *lower* species of animal organization, the moist and leafy New World, in its tropical part at least, if it does not excel, at least rivals the luxuriance and splendor of the Orient. Humming-birds, brilliant as rubies or emeralds, all of them American, cannot be called low in rank, although so small; and nowhere are there more brilliant Butterflies, Beetles, Fire-flies, and other insects than in South America. Our serpent *fauna* culminates in the enormous Boas (Anaconda, the most famous), sometimes twenty or thirty feet long; one of which will swallow a young heifer, slowly, *whole*, for a meal! Many other serpents, both venomous and harmless, as well as creatures of still inferior grade, are numerous in the damp, shady forests, rivers, and swamps of America.

Man himself was first (there is no room for doubt) a creature of the *Old World*. But his law of development and perfection is not the same as that of the rest of the organic world. Man is not *merely* an animal, although he shares the animal nature in subordination to his higher being. The law which affects his distribution and elevation in the world is, as Professor Guyot says, "of a moral order." While, then, the *vegetable* and *animal* kingdoms are at their highest perfection in kind, number, and variety in tropical and subtropical countries, yielding gradually in all respects as we pass from the equator towards the poles,—the strongest, noblest, and most cultivated races of *men* are found dwelling in the *temperate* regions of the earth.

Originally, Man was subtropical. Eden lay in Western or Southwestern Asia. But, as the race degenerated, the ease of living without effort in the lap of nature enervated his higher powers. Like Samson with Delilah, he was shorn of his best strength. True, there were great empires, arts, and civilizations once, in and near the tropical countries: Egypt, Assyria, Babylonia, Persia, India; but all, long ago, perished. "Assyria, Greece, Rome, Carthage, where are they?"

Now, the foremost nations of the world belong to the old *Aryan* stock in its Teutonic, Celtic, and Italic branches: Europeans or Euro-Americans. If we leave Europe, and travel southwards across the Mediterranean, we come to Berbers, Algerines, Tunisians, Egyptians,

Fig. 128.

GIGANTIC CEDAR OF CALIFORNIA.
Wellingtonia Gigantea.

PORTRAITS OF FEMALES OF VARIOUS RACES.

1. Negro (W. Africa); 2. Barolong (S. Africa); 3. Hottentot; 4. Gilyak (N. Asia); 5. Japanese; 6. Colorado Indian (N. America); 7. English.

none of them equal to the populations of Southern Europe in physical, intellectual, or moral development. Beyond these are other semi-barbarian tribes, deepening in color, and mostly in savagery, all the way to the centre of Africa, as yet but partially explored. Farther yet south come Caffres, Hottentots, Bushmen. South Africa is, by colonization from Europe only, rescued from total barbarism.

Northward, it is true, climatic conditions are too severe for man's best advancement. Amid sub-polar snows the struggle for life against inclement nature is too hard. Stunted races are there,—Eskimos, Kamtchatdales, Samoiedes, Yakutski, Lapps, and Finns. Neither extreme of poverty and desolation, nor of luxurious redundance, most favors man's best advancement. In the temperate climates are met enough occasions for arduous toil, enough of exposure, enough of conflict, to draw out and train manhood and womanhood to their highest and strongest maturity.

Temperate climates have, since their first outstart from the ancestral cradle of mankind, been the home, through all their migrations, of the Teutonic race and nations. Entering Europe north of the Caucasus, they spread along the course of the Danube to the countries where the German language in its different dialects is now spoken; and farther, into the lands of Scandinavia: Denmark, Sweden, Norway. Angles, Jutes, and Saxons conquered England; Normans, France; then William the Conqueror concentrated the energy of his race in that island which was to become the centre of a world-wide empire. Our English tongue, essentially half Saxon and half Latin in its origins, is a perennial witness to the main facts of this long and wonderful history of a ruling race. And through its language, if not otherwise, that race appears to be destined yet to conquer or possess the whole world. Let us hear what an American scholar says of this:* "Conqueror of the Roman Empire, and the legitimate inheritor of its glory, the race of Teutons has sent its sons broadcast over the earth, and has its offshoots, as flourishing communities, on every continent." "We are in this land to-day the representatives of a civilization which has never lost a foot of soil to which it has been transplanted, nor yielded by force of arms to any rival or competitor for supremacy; for wherever Anglo-Saxon domination has been carried, there it has been permanently established."

Another question: Can an individual or a race become, without loss of health, entirely naturalized, *acclimatized*, in a climate entirely different from that of his or its nativity? This involves the inquiry, Are all races of men of one common ancestral origin? If they are, it has

* Professor Joseph Carson, of the University of Pennsylvania.

been proved already by the facts of history that branches of the human family *have* been, and therefore may again be, gradually adapted to the conditions of any part of the globe (except the poles) so as to live upon it for many generations, nay, for centuries.

Thirty years ago a very lively controversy was carried on amongst scientific men as to whether the so-called Caucasian white man, the red American Indian, yellow Mongolian of Asia, and African negro, are or are not of one blood, of common origin, one species. Apart from the usual interpretation of the account in Genesis, the greater number of leaders in science* were, and now are, well satisfied, by several kinds of proof, that all races of men, of every complexion and language, as well as of every continent, have *descended from the same stock:* there is but one species, Man.

FIG. 129.

HEAD OF APOLLO BELVEDERE.

FIG. 130.

CHINESE.

Evidence of this is derived: 1. From the likeness of all races in *bodily structure;* in their anatomy and physiology. *Color* is a most secondary thing; there are fair blondes and dark brunettes with light, medium, and black hair, in the whitest of races. 2. In the *productiveness of marriages* among all the races. Mixed races are as durable as those of the purest separate stock. This is not the case (amongst animals or plants) with *hybrids* of different species. 3. In *mind,* all are *human,* and nothing else. Our Saxon ancestors were very far down in *un*-civilization. As they and we have risen, so may others, now savage, rise. All the faculties we have belong also to them. 4. Many *other sorts of animals show greater diversities* among the descendants of

* For examples: Linnæus, Cuvier, Alexander and William Humboldt, Richard Owen, Huxley, Sir C. Lyell, Dana, Quatrefages, Max Müller, and Sir J. Lubbock.

the same stock. Darwin, in his book on the "Origin of Species," dwelt on this in regard to the varieties of pigeons. All dogs likewise—Newfoundland, Shepherd's dog, Bull-dog, Greyhound, Terrier, Lap-dog, and the rest—are known to be of *one species.* So are all horses and all cattle, various as they are in size, shape, color, and other qualities. 5. *History* traces the migrations of all mankind back *towards,* if not to, Western Asia. When history loses the track, tradition follows it on, though in the twilight of the past. 6. *Common traditions* of peoples in all the continents, differing in everything else, are so alike that it would seem they must have all derived them from the same original source. Such are: the belief that mankind have descended from one first created pair; that, because of their sins, all were destroyed by a deluge except one pair or family; a belief in the virtue of sacrifices to

Fig. 131.

INDIAN WARRIOR.

Fig. 132.

A KAMTCHATDALE.

appease offended Deity; and also in the coming, past or future, of a Divine deliverer assuming the form of man. All these have been found by the first explorers of new regions in Asia, Africa, and America, as well as in Europe. 7. *Language* alone gives facts almost enough to settle the question. With all the varieties of tongues over the world, enough is possessed in common by them all to make one origin a necessity. 8. But the most influential argument with those who travel much is the fact, that *all the races grade into each other.* There are nowhere sharp dividing lines. Some persons suppose that all Africans are Negroes. Yet probably not more than one-fourth of the inhabitants of Africa are such. Egyptians are not Negroes; neither are Nubians nor Abyssinians; nor Berbers of the north, nor Caffres nor Hottentots of the south. So gradations occur in Asia also; and, of course, in Europe the differences make no one imagine difference of race origin.

15

All over America, Indians are so much alike that Dr. Samuel G. Morton, who studied them with great labor, concluded that *they*, at least, must all have come of one stock, although he did not believe this of the races of other continents.*

Concluding, then, without hesitation, that all mankind are of one family, it follows that **acclimatization** in any place already inhabited *must be possible.* It may, however, be slow and difficult, and in certain cases may not succeed.

Some English people assert that our American population, coming originally from Europe, are so unfitted to a Western climate as to be *degenerating* here; that we are all by degrees "turning into Indians." We, on our side, do not see this. Population increases in the United States (*besides* immigration) faster than in any European country.

FIG. 133.

MOZAMBIQUE NEGRO.

FIG. 134.

FEMALE BUSHMAN.

Statistics taken during the Civil War showed that the average height and weight of men (especially in Kentucky and Tennessee) are somewhat above those of England, Scotland, Ireland, or Germany.

What nation can produce a man who will lift more than our Dr. Winship — over 2000 pounds? Our Harvard oarsmen, Creedmoor rifle-teams, and Philadelphia cricketers, as examples of activity and skill, if not always victorious abroad, at least have proven their fair equality with our British cousins. Intellectually, within a couple of generations, while they, in statesmanship and oratory, have had their Gladstone and Bright, we have had Webster, Lincoln, and Garfield. In poetry, Bryant, Longfellow, and Whittier rank well with the English laureates. As historians, Irving, Bancroft, Prescott, and Motley have

* It is proper to mention that L. Agassiz, Prof. Leidy, and a few other noted scientific men, have doubted or denied the common origin of all races of men.

had no superiors. So in art, with our Powers, Story, Church, and many others. In *invention*, America leads the world. The Patent-Office at Washington is a mechanical wilderness of materialized brilliant ideas; a fair proportion of which are practical and useful. Towards the relief of disease and suffering, while Europe has given the world *vaccination* to control small-pox, America has originated *anæsthesia* (by ether or nitrous oxide) to make operative surgery painless. We, as a race, are *not* degenerating. Instead of that, the *composite* character of our people, made up of Anglo-Saxon English, Celtic Scotch, Irish and French, old Teutonic Germans, Swedes, Norwegians, and Danes, Italic descendants of South Europe, besides a contribution from Eastern Europe, and some, though less important, from Asia, Africa, and the far-off islands of the Pacific,—this makes all the qualities of the nations to mingle in our blood, as the wealth of the world's four quarters is gathered into our garners and storehouses. Guyot has well shown that, as Asia was physically suited to be the cradle of our race, and Europe man's school and gymnasium for training and development, America is to be the arena for the largest, freest, fullest exercise of all his powers.

"Westward the course of empire takes its way."

It is true that some special bodily and mental characteristics are promoted by our climate in ways not easily understood. Brother Jonathan is leaner and longer-faced than John Bull; the caricaturists are right in that. Typical Americans, such as Henry Clay and Abraham Lincoln, not rarely exemplify it. Our national temperament is excitable; in this more Celtic than Anglo-Saxon; but we hold on hard, like the latter, in our grip. There is more quick movement in a stock-exchange, a prayer-meeting, or a lunatic asylum, in one hour in America than in two or three days in England or Germany. Some one has said that the American has "blood of fire coursing in veins of ice." All this, however, is no sign of inferiority; it marks the triumph of mind and race over conflicting circumstances. Our continent had to be conquered; during the warfare, hardihood and alertness have been specially developed. Refinement may, and will, come later. America affords no instance of the impossibility of successful acclimatization.

Again, India, it has been *predicted*, will be the grave of the English race,—a costly though splendid conquest and possession. Many official and commercial British residents in India have shortened their lives there, and few have raised healthy families. But, why? Not only because they go from a temperate to a tropical region. Also, they have taken their *home habits* there. Not good for them in England or anywhere else, their wine, beer, and spirits are far more destructive under

the equatorial sun. Moreover, India has many unwholesome local conditions (making it the starting-place for epidemic cholera) which are *removable.* Florence Nightingale, one of the wisest of sanitarians, is no doubt right in her belief that India in most parts can be made, with prudent habits, habitable for Englishmen. It is simply necessary for this that they be, like their climate, temperate, and that they instruct and lead their Oriental subjects in local sanitary improvements.

Accepting it as certain that all races, black, red, yellow, and white, are of the same original stock, we find complete acclimatization established in the African negroes. Their present climate, especially in Western tropical Africa, is a deadly one, with its fevers, to Europeans or Americans. Negroes do not suffer from malarial fevers, scarcely from yellow fever. This immunity, like their dark skin and woolly hair, is the growth of many centuries. As to yellow fever, they lose somewhat of their security in a few generations of residence in our Southern States. So, in the Northern States, they lose by degrees (even without mixture of blood) a good deal of the deep tropical shade of complexion. There are few really *black* people now in the North; more in the Gulf or Cotton States; many more in Central Africa.

Diseases of *warm* climates are essentially those of the hot season in temperate regions: affections of the stomach, bowels, and liver, besides endemic and epidemic fevers.

Those of *cold* climates are predominantly disorders of the breathing organs and typhus fever, with those also which are not specially under the influence of climate, as diseases of the kidneys, heart, brain, etc., typhoid fever, small-pox, diphtheria, and other contagious affections.

Malarial diseases (fall and spring intermittent and remittent fevers) are *worst* in certain, though not in all, hot countries. But they prevail also in some warm temperate regions; their limits being pretty far north, farther in that direction in Europe than in this country. Early in the settlement of New England, chills and fevers were not rare there. Gradually they disappeared for a long period. Now within a few years a considerable number of instances of genuine malarial fever have occurred in the valley of the Connecticut River.

The United States may be, for climatic comparison, divided into three great districts: 1. The **Atlantic**, from the eastern coast to the Alleghany Mountains. 2. The **Middle**, from the Alleghanies to the Rocky Mountains. 3. The **Pacific**, from the Rocky Mountains to the ocean shore.

Observation by medical officers of the army, through a number of

years, has given an estimate of the mortality of these three districts as follows: *Middle* region, much the greatest; next, the *Atlantic;* least, the *Pacific* region, west of the mountains. The cause of this difference is the large amount of malarial disease (fevers and connected disorders and their results) in the Valley of the Mississippi. There is also a considerable prevalence of such diseases in the Atlantic region, and none in the Pacific. Yellow fever (though irregular in its visitations and malignity) belongs to the southern parts of the Atlantic and Middle, not to the Pacific, division.

According to the United States Census,* we have the following distribution of the greatest mortality from some principal diseases:

Consumption: Parts of Maine, Virginia, Tennessee, Kentucky, Ohio, and Indiana.

Malarial Diseases: Northern Florida, Eastern South Carolina, South-eastern Texas.

Bowel Disorders: South-eastern Mississippi, Central Michigan, and the borders of Western Iowa and Eastern Nebraska.

Typhoid, Typhus, and **Cerebro-spinal Fevers**: South-eastern Georgia, Eastern Mississippi, northern part of South Carolina, Eastern Missouri, and Central Minnesota.

Besides the deficiency of exact reports from several places included in this statement, changes of population and sanitary improvements (or the reverse) may make considerable differences from time to time. Yellow fever, which has in some years been terribly destructive in New Orleans, Memphis, and other Southern cities, bids fair to be more and more excluded; **not** by "shot-gun," or any other rigid *quarantine*, but by so **improving** the drainage, sewerage, water-supply, and cleanliness generally of the fever-nesting places, that the fever can get no foothold anywhere.

Man, as we have seen, is, by reason of his intelligence, **cosmopolitan**,—a citizen of the whole world. Borrowing the furs of the bear, seal, deer, and buffalo, and using the forest- and mine-fuel, or, far north, the fat of animals for burning, he defies polar cold. With prudence, also, he can exist under tropical heat. No other earth-creature can do so much in enduring all climatic changes; only some of his companions, either chosen or unwished-for, approach him in it, as the dog, cat, ox, horse, sheep, goat, rat, and mouse.

Best climates in the world for health are those which are *not extreme*,

* Imperfect registration in many places causes these returns to be only an *approximation* to the real facts of comparative mortality.

and are *equable*, without sudden changes. Cool temperate, and warm temperate regions both afford such situations. A rather *high* locality in a *subtropical* latitude must be the perfection of climate. Such was, according to many converging lines of proof, alike of history, tradition, and language, the Eden birthplace of humanity.

What is the best climate for **consumptive** persons to live in? Our first answer must be what has just been said above; **moderation** and **equability** are the most essential requisites. But, farther, shall it be cool or warm, high or low, dry or moist, among the hills, or by the side of the sea? Again, it may be said that the needful qualities are to be found, more or less completely, under any and all of these conditions. The least number of deaths from consumption in this country occurs probably among the natives and life-long residents of New Mexico; but few people want to live there. According to the statistical figures, there is a sliding scale of consumptive mortality in Europe and in this country corresponding with *elevation above the sea-level;* the lowest regions have most, and the highest least, of such mortality. But is not this almost exactly the scale, also, of *thickness of population?*

Baudelocque in France, McCormack in Great Britain, and Parkes for the British Navy, have shown that *closeness of living*, breathing bad air in-doors, is a very great promoter of consumption and allied diseases. Also, Bowditch in this country and Buchanan abroad have proved a similar promotive influence in *dampness of situation of dwelling-houses.* Mode of living, then, is of consequence as well as actual locality. Out-of-door life as much as possible is best for the consumptive, and dryness of his dwelling, with sufficiency of clothing, is indispensable. On the whole, we may expect that those climates will be most favorable for lengthening the consumptive's life in which he can remain out of doors without risk of injury *the greatest number of hours* through the *greatest number of days* in the year.

Let us see what places are most famous as resorts for patients with consumption. These are for Europe: Davos, in Switzerland; Biarritz and Pau, of the Pyrenees, as mountain-places; Mentone, Sorrento, Capri, and Malta, near or in the midst of the sea. Africa furnishes Algeria for the year round (according to French medical authorities), and Egypt for the winter season. The island of Madeira was formerly a favorite place with invalids.

In our Western hemisphere the opinions of physicians and sanitarians are somewhat divided about the comparative value of different localities of refuge for consumptives. The Adirondack Mountains, Minnesota,

Colorado, Florida, and Southern California are all recommended, and each has answered well for a certain number of persons. *No one place is sure to agree with all.*

At Anaheim, in Southern California, there has been found an average sum of eighty-one fair days through the months of December, January, and February. Mentone, during the same months, averages sixty-seven fair days; Davos, Switzerland, fifty-four; and Aiken, South Carolina, about as many, in which an invalid can be out of doors all day long. The mean temperature for the winter months at St. Augustine, Florida, is a little over 60° Fahr.; Anaheim, 61°; Aiken, 53°; Mentone, 48½°. San Diego, Santa Barbara, and San Bernardino, in Southern California, are much praised by residents and visitors for their salubrity. Nassau, on one of the Bahama Islands, has a very mild and equable climate through the year.

Probably the best thing for a consumptive in this country, *if well enough to leave home at all* (an important question in each case), is to *migrate*, like the birds, according to the *season*. If he be a dweller in an Eastern State, and can afford it, let him camp out in the Adirondack region, or live still more at ease in Newport, Rhode Island, from June to October; then let him winter, from October till May or June, in Florida. Should his home be west of the Mississippi, let him summer in Minnesota, and spend the winter months in Southern California. But it must be here urged that no one in the last exhausted stage of pulmonary consumption (or, of course, of any other disease) ought to travel *anywhere*. One who is clearly near his end had better remain to die amid the comforts and consolations of his home. Earlier in that often very slowly progressing disease, much is gained, in a great many cases, by a change to a milder climate than that of our Northern States for the winter months; with recovery in a few instances, prolongation of life in a greater number; some relief or mitigation of symptoms in nearly all.

Recorded Temperatures for One Year, San José, California.

Month.	Deg. 6 A. M.	Deg. 12.30 P. M.	Deg. 6 P. M.
June	52.40	77.03	60.40
July	55.32	81.87	64.84
August	53.16	83.17	64.84
September	55.63	79.68	65.16
October	46.38	74.68	63.06
November	34.40	56.77	52.30
December	36.61	53.63	45.26
January	36.68	54.42	48.00
February	38.93	58.32	48.61
March	39.99	62.58	51.29
April	50.37	69.23	54.00
May	48.26	69.90	54.97

FOOD AND DRINK.

One of the founders of the Academy of Natural Sciences of Philadelphia, Thomas Say, so begrudged the time taken in eating his meals, as to wish that he were made with a window in his stomach, so that he could put in a day's supply all at once, and be done with it. But if that were so with us, probably the busy naturalist and some others would occasionally forget all about it, and let the body run down for want of food. We are more wisely created. Hunger and thirst remind us of our needs. Naturally, we desire food about three times every day; at least twice a day we must have it, or suffer in health and strength.

Why must we take food so often? Because *change* is the law of life. No particle in our bodies in old age is the same as when we were born; much of our substance has altered a little even since yesterday. It is not true that all of the body is renewed once in seven years. Our bones are new grown entirely only after long periods; the enamel of the teeth, once lost, is never formed again; while the outer covering (epithelium) of the skin is being shed in scales, like tiny leaves, all the time, and our blood is undergoing hourly, momentary changes.

We are, as is said in Genesis, made of the dust of the ground. The elements of "mother earth" are the very same as those of our bodies. These elements climb through vegetable life into a condition higher than that of the mineral kingdom, and then animals transform them into their own substances, and after a time, having used them for the purposes of their organs, throw them out again.

This is the perpetual round or cycle of nature. What do plants live on? Chiefly water, carbonic acid, and ammonia. On what do animals live? Plants. *Carnivora* in eating each other do the same, only indirectly, secondarily. What are the results and products, the "smoke and ashes," of animal life? Ammonia, carbonic acid, and water. So every particle rises from the earth, as drops of water ascend in the fountain; after reaching its highest state, it soon begins to descend, and falls again "to the earth as it was,"—dust unto dust.

Every animal, then, must have food; but how various their diet! Our domestic animals instinctively show this. The ox browses and chews the cud; the dog and eat tear and bolt raw flesh; the hog is content with either kind of food. Wild animals likewise differ: the birds and beasts of prey tear their victims with teeth and claws, while deer, antelopes, and camels consume only vegetable food. Some eat the grass and herbs at their feet; the tall giraffe breaks off leaves and

twigs of trees. Ducks and geese find nourishing things in mud and water; king-fishers, pelicans, and cormorants seize and devour fish. The big, ugly hippopotamus feeds on fish by day, and at night steals ashore to consume herbage on the river banks. Some birds eat worms or flies; others grains or fruits; many both. The humming-bird lives on honey and insects, his long tongue being usable either as a sucking tube or as a pair or nippers. Bees take for food both honey and the pollen of flowers.

Certain animals, mostly small, live in or on the bodies of others: parasites. Human beings are so invaded by round worms, tape-worms, trichinæ, and others. But the smallest creatures do not escape such attacks. Silk-worms and flies are beset by tiny, destructive enemies. Prof. Leidy, with his microscope, has shown that parasites themselves suffer from parasites; thus making almost true the doggerel:

> "Great fleas have little fleas, and these have fleas to bite 'em;
> And these again have lesser fleas, and so *ad infinitum*."

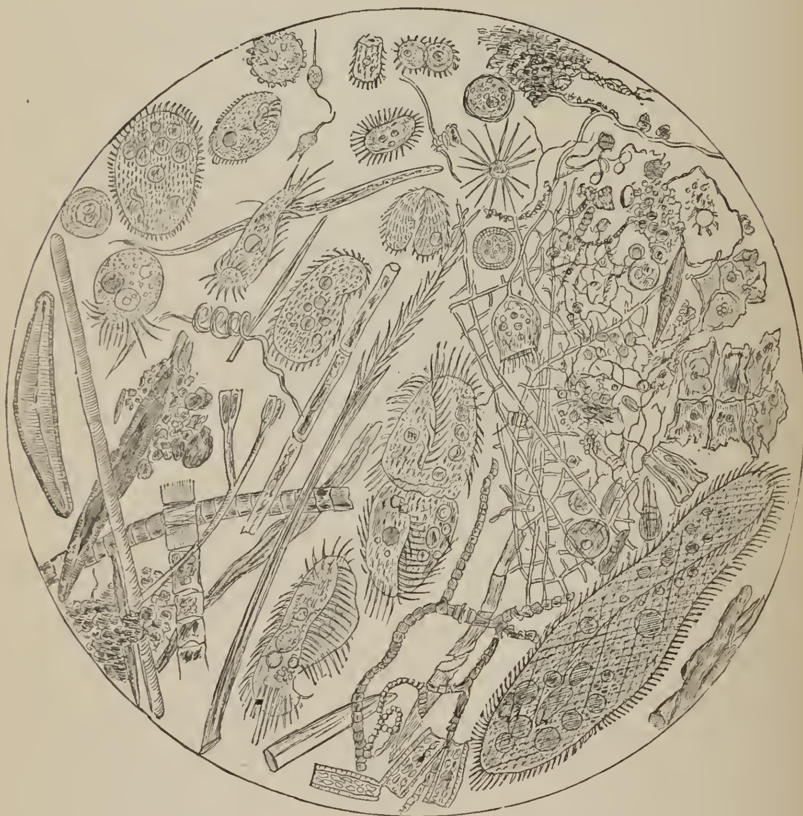
Many animals, large and small, are wood-eaters: elephants, beavers, some larvæ of beetles, the teredo (enemy of the dikes in Holland), and white ants, for examples. In tropical climates, white ants (termites) attack houses in such numbers as to eat out all the interior of posts and beams, leaving them ready to fall with slight shocks. Even camphor scarcely protects our garments and carpets from clothes- and carpet-moths. In the sea are stone-borers (Pholades and Modiolæ), which, with their shells, can wear away solid columns. The famous temple of Serapis at Pozzuoli, in Southern Italy, bears witness to this in its pillars half submerged on the margin of the sea. One insect-grub (Sirex giganteus) has been known to gnaw leaden bullets in soldiers' cartridges; another (Cetonia) to pierce the leaden coverings of house-roofs. Blood-suckers are the mosquito and the vampire-bat; of the latter, extravagant stories are told: it does not often suck human blood. Sap-suckers upon plants and trees are the *aphides* (ant-cows); the birds of that common name (sap-suckers) pierce branches only in pursuit of worms or grubs.

Literally, it is true that one animal's meat may be another's poison. On the Jamestown weed of this country (Datura stramonium), whose berries sometimes poison children, goats can browse unharmed. There is no drug most deadly to men that does not furnish food for some creature: lunar caustic, oil of vitriol (once thought to destroy every organic substance), opium, strychnia; even the venom of the rattle-snake! These last poisons are fed upon at least by *animalculæ*, which take the leavings everywhere of the greater animal world. Infusorial

animalcules are innumerable in many waters, and they, and equally minute fungoid vegetable forms, abound often in moist air.

This great *variety of food* is essential to the balance of nature. Without it, no check would exist upon the overproportion of a few kinds of beings; the sea would be filled with fishes, the forests, denser than Brazil, would become crowded with animals, and the air clouded with

FIG. 135.



LIVING THINGS IN RIVER WATER.

Magnified about 200 diameters.—(Parkes.)

birds and insects, in a very few years of ordinary multiplication. But the struggle for existence keeps down this excess, and the *flora* and *fauna* of a warm country may support together thousands of species. Oak trees alone feed 200 kinds of caterpillars; nettles, 50 different sorts of insects; pine trees, 400 species. In Sweden, one kind of yellow

fly devoured in a single year 100,000 tons of barley; another fly in France, 3,000,000 of olives. Insects (among them the *phylloxera* of the grape-vines) are computed to destroy in France 100,000,000 of dollars' worth every year. In our Western country, the Rocky Mountain grasshoppers, during some years, do nearly or quite as much harm.

But this immense need of food for animals, so much greater than that of plants (even of the largest trees), needs to be farther explained. It is not only because we **waste**, as fire does in burning, and the tree in growing and shedding its leaves, but also because we **work** and **go**, that we must have so much nutriment, and must have it often. We are, so to speak, living locomotives. Action, as well as growth and wasting or decay, must be supplied. And this action is of two sorts—*within* and *without* us. Every heart-beat uses energy; digestion is a kind of work; so is secretion, and, of course, respiration. *Foot-tons* are the measure in which we estimate the daily work done; for example, in the circulation of the blood by the heart and blood-vessels. What fuel must be necessary for all this,—besides all that our muscles do in labor or exercise of every kind!

A young bird has been known to eat once and a half its own weight of food in a day; a robin, 800 flies in an hour. A pair of swallows will carry 200 or 300 worms and caterpillars daily to their young ones in the nest. What becomes of all this? Not all is appropriated in growth, for their increase in weight will not account for it. A good deal must be consumed as *fuel*, for getting up energy; very much as coal or wood is burned, under an engine-boiler, to get up steam.

When the fuel has been all used up, more must be provided, or the animal dies. A mole, kept without food for twelve hours, will be starved to death. A cat (once to my knowledge) may starve in a week; a wild-cat, in twenty days; a dog, in thirty-six days. An eagle will survive without food for five weeks. The boa constrictor of South America, after swallowing an enormous meal, perhaps an animal as large as himself, lies still, digesting it for a month or more. A fat hog has lived 160 days without food. The scorpion can fast three months, the spider a year, the sacred Egyptian beetle (scarabæus) for three years!

Man cannot compete with these slow livers in long abstinence. On the average, nine or ten days without food will end a human life. After the wreck of the steamship Arctic, a man floated nine days in the water and was picked up alive. Benjamin Lay, the eccentric "hermit of Germantown," Philadelphia, fasted three weeks and then became delirious, and was fed by his friends, saving his life. Dr. Tanner's forty days' self-starvation and survival, in 1880, made him famous. Miss "Lizzie" Bradley died at White Cloud, Kansas, in 1884, of starvation,

after a fast of fifty-three days. She had made a vow "never to eat or speak again," and kept it. Shipwrecked persons have not only hunger, but often thirst, as well as cold and fear or expectation of death, to aid in depressing vitality. This was the case with Lieutenant Greely's party, whose sad story became so familiar in the year 1884. Their scanty rations, under long suffering from terrible cold, made it not incredible that some of them might have eaten the flesh of their companions who died the soonest. Yet a reliable author, Dr. Robert Willis, tells of the master of a water-logged ship who survived twenty-eight days without any solid food, having also no drink except rain-water gathered in the palm of his hand as it trickled down the mast. Captain Hopken, of the brig Shelchof, in 1871, was taken alive from the wreck of his vessel, October 19, having been there since its disablement, July 3, and the greater part of that time without food. He had, before the wreck, weighed 235 pounds; when taken off, 120 pounds. All on board but himself had died some time before he was found and rescued.

Questions about the hygiene of food are these: *how* should we eat, how *often*, how *much*, and *what?* That is to say, we inquire into the **manner** of taking food, the **frequency** of meals, their **quantity**, and their nature or **quality**.

As to the **manner** of eating, the precepts are simple, but not without importance. We should eat *slowly*, *cheerfully*, and, if possible, in *good company;* and we ought to *rest* awhile, in mind and body, *before* and *after* meals. Slowly, in order to chew well what is taken; dividing all meat and other solids up, so that the chemical action of the digestive fluids may be complete, and mixing the saliva with everything, especially with the *starchy* food.

Hurrying our meals promotes *dyspepsia* (very common in America from this cause), and, probably, early *decay of the teeth*. Some business men snatch half an hour or less from their mid-day work to *bolt* something, or else content themselves with General Scott's "hasty plate of soup." This is very bad. Merchants, as well as day-laborers, should have an hour at least free for a noon meal. "After dinner, sit awhile; after breakfast, read awhile; after supper, walk a mile." This sensible maxim refers to the need of the completest rest after the heaviest meal. Even reading, unless it be only a newspaper, is not beneficial immediately after dinner. The habit some college men have of taking a book for study to the table is, hygienically, a vicious one. After a rather light meal, as breakfast, reading, at least, may come soon; and supper, which ought to be the lightest, may be followed by a moderate walk.

What is the reason for this rest at and before and after meals? Simply that digestion requires *energy;* it is internal work; and there is only a limited supply of energy available for work at one time in the body. It is somewhat like the fixed number of "horse-powers" furnished by an engine in a building, to be distributed for different operations; or the water-supply of houses according to our system in Philadelphia. When the steam or water is being used in one story or room, there is less or none obtainable in other parts of the building at the same time. All who ride or drive horses know, likewise, that it will not do to drive an animal hard immediately after full feeding. The same principle applies with them as with ourselves.

Stress of mind, anxiety, or disturbance of feeling, will often interfere with digestion.

> "Read o'er this, and this; and then
> To dinner, *with what appetite you can.*"

Hence cheerfulness and sociability belong, so to speak, with the dinner-table furniture. Mirth is better, at dinner-time, than metaphysics; "laughter, holding both his sides," more wholesome there than all the wisdom of the Egyptians. Mallock was wrong, in his "New Republic," in making learned men and women discuss difficult problems of life at the table. It was like giving them stones for bread; they must have gone away dyspeptics, and so have thought life hardly worth living.

To the question, **how often** we should eat, there is no absolute or universal answer. At least twice a day, it may be said with entire safety. Many people, in France, take (besides a cup of coffee on rising) but two meals—breakfast and dinner. Most English people are accustomed to four repasts—breakfast, lunch, dinner, and supper. I have tried both ways while travelling, and found no difference in comfort, health, or strength; the more meals, the less is naturally taken at each. But I believe *three* meals, the most common habit the world over, to be the most natural, and best on the whole.

Custom has much influence here. English people, in Edward the Fourth's time (fifteenth century), ate dinner at about ten o'clock in the morning. In Queen Elizabeth's day (sixteenth century) the hour was between eleven and twelve o'clock. Cromwell brought it down to one o'clock. Charles II. imported French usages into England; among them, lateness of hours. Addison dined at two; and Pope, the poet, complained of being invited out to a four o'clock dinner. Another century made it common, as now, for it to be later still. Germans have

the dinner-hour mostly between one and four o'clock. In this country there is every variety of hours, with an increasing tendency towards lateness, at least in the cities.

People say that it is reasonable to put off the chief meal of the day until the work of the day is done. That is so, if the dinner is to be "the event" of the day—a two hours' feast, after which no one is good for much. This was common in the old days, such as Burns wrote of, when

> "Who first beneath the table falls,
> He shall be king among us three."

When great statesmen and authors (not to say preachers) were, as to their wine, one-bottle or two-bottle men, an hour near bed-time was undoubtedly the best for dinner. But all this is changing; and gluttony, as well as inebriety, has almost ceased to be a virtue. In the next generation both will probably be called vices.

If we ask, then, what are the *best* hours for most people, nature and experience furnish a reply. A meal is digested in from three to four or five hours, therefore the interval between meals ought not to be *less* than that time. Few can comfortably take at once enough food to *last well* over six or seven hours, at least when they are doing work, bodily or mental. Hence we can name the limits: *not less than four nor more than seven hours between meals.* Best of all, I believe, are the old rural ways: breakfast, an hour, more or less, after rising—say between 6½ and 8 o'clock; dinner within an hour or so of noon—12 to 1½ o'clock; supper, early in the evening—6 to 7 o'clock.

How does it happen that English people often take a very solid (though not very bulky) supper, as a regular thing, just before going to bed? Because, dining late in the afternoon, and no tea following, the time elapsing before they retire allows the meal and its effects to disappear, especially if they sit up late. Then they are ready for some food, which goes on to be digested during sleep. Late and *heavy* suppers, of indigestible *superfluities*, taken not for hunger but for gorging self-indulgence, are very apt to disagree. Nightmare, "biliousness," sick-headache, and dyspepsia naturally attend upon them.

We are thus brought to recognize a principle in the hygiene of diet, namely, that *hunger is the signal* for the taking of food; and it may be minded with advantage, as a rule. Some people almost never feel *hungry*, even when long fasting. They, however, feel empty and weak (more or less) when their "blood-fuel" runs low; and such sensations mean with them what hunger means with others.

Ought we to eat anything, then, between meals? If the time is very long, yes; if not, generally, no. But, if hungry or exhausted, eat,

between meals, *a little.* A crumb or a drop in time will do better than nine left late. Feeble persons, especially, ought to regard this as a rule, *never to go very long without food.* I have known attacks of sick headache, neuralgia, and even convulsions, to be brought on by the delay of meals; and, when threatening, to be prevented by the timely administration of food.

One who has to sit up at night with a sick person, or on any other duty, should have some *extra food to take during the night.* A little may do; but that little will make much difference in the fatigue of long watching.

About the diet of the sick, more will be said later in this book. Just now, we may remark that it is a subject much better understood now than formerly,—even half a century ago. Once "low diet" was *very* low, and was kept up long through illness. Now we know that disease *weakens* the body. There is a time at the *beginning* of a sickness when a person, before strong, may abstain from food with advantage; but feeble persons cannot bear even this. We *waste* during illness; and although appetite is absent, and the stomach cannot digest ordinary solid meals, yet the body must be supplied. This is done by giving *small quantities of strong liquid* food *often.* Milk and beef-tea are thus advised; during some cases of typhoid fever, for example, every hour or two a tablespoonful or two at a time, *day and night.*

We have now seen the reasons for our need of "daily bread." **How much** food is required every day? A grown person, on the average, during health, will consume *two pounds and a half* of solids, —of which at least two-thirds may be vegetable food,—and about *two and a half pints* of water, including tea, coffee, or other beverages.

A good supply will be three-quarters of a pound of meat (counting the lean only), a pound and a half of bread or other vegetable material, and a quarter of a pound of butter or other fat.

Children have need of quite as much *in proportion to their size* as working adults. Their growth requires new substance, and their active play takes the place of work in consuming "fuel-food."

An *infant,* six months old, will take comfortably from *two and a half* to *three and a half pints* of milk in twenty-four hours. Solid food should not be given to babies until they have some teeth with which to chew it.

Apart from starvation, it is interesting to know the *least* amount any one can live on. An Italian gentleman, Louis Cornaro, when about eighty years old, set himself to eat only *twelve ounces* of solid food, and

wash it down with fourteen ounces of light wine, every day. He lived to be a hundred years old. Most probably his constitution was remarkable, and he lived a quiet old gentlemanly life, with nothing to wear him out. Under the pressure of necessity, Captain Parry, the traveller, with his men, lived for some time on rations of *twenty ounces* each of solid daily food. Nobody is likely to live long on less than this, or, at all events, on less than Cornaro's *minimum.*

Maximum amounts we read of in the Arctic regions. Big fires, furs, and much food are needed there to keep out the cold. Warmth of the body is sustained by increase, especially, of *fatty* food. Seal's, walrus', bear's fat, the Eskimos consume freely. One of them is said to have eaten *twenty pounds* of fat meat in a day! An Eskimo boy is told of who devoured in one day ten pounds of meat and fat, besides a pound of tallow candles thrown in for variety. Under the disease called *bulimia,* with a morbid appetite, yet greater quantities have been taken; but instances of this are rare.

Must we *weigh* or *measure* our food to get its right amount? No. Our appetite is, by nature, proportioned to our needs. *When hunger is satisfied,* it is time to stop eating. Not that we should eat as much as we can with enjoyment or comfort. Stop while you *could* still take more, but feel that you have *had enough.*

We should never *feel* our stomachs, when in health; one ought not to know, except by studying anatomy, that he has a stomach. But while, like other organs inside of the body, the sound stomach has no sense of touch, no feeling, it soon *becomes* sensitive when not well treated. When worried by having more put into it than it is prepared for, it suffers, and, so to speak, complains. If there is a decided internal feeling after a meal, it shows that something is wrong. Either we have eaten *too much,* or *too fast,* or have been *worried* at it, or were *dyspeptic* at the time. Dyspepsia is habitual indigestion. Errors of diet are its most common causes.

We cannot, to-day, anticipate to-morrow's dinner; nor, even, eat at breakfast (without injury) enough to last the whole day. It is worth while to take much pains to avoid dyspepsia; for it is almost a kind of "horrors." Children very seldom eat too much of *simple, wholesome* food. When they are pampered with *goodies,* as sugar-plums, candies, and cakes, they often do hurt themselves by large excess.

What shall we eat? Nature here furnishes our common answer; science simply interprets and explains nature. There are certain clear facts about all articles of food. First, they must contain some of the

elements of the body. These elements are *Carbon, Hydrogen, Oxygen, Nitrogen, Sulphur, Phosphorus, Iron, Calcium* (the metal of lime), *Potassium, Sodium, Chlorine, Fluorine, Silicon;* occasionally, Manganese, Magnesium, and one or two others. In our Physiology, we have seen that the most *important* of these are Carbon, Hydrogen, Oxygen, and Nitrogen; but a certain amount of Sulphur, Phosphorus, Iron, and Calcium is indispensable; and the body needs also, from time to time, a supply, not large, of all the rest. Carbon, Hydrogen, and Oxygen are in all the tissues, Nitrogen in all except fat, Sulphur is in the bile, Phosphorus in brain and bones, Calcium in bones and teeth, Iron in the blood-corpuscles, Potassium and Sodium in the blood and other animal fluids, Fluorine in tooth-enamel and brain-substance, Silicon in the hair. Here is quite a wide range; and most of our usual articles of food contain several of these elements together.

Secondly, our food must be (except *water* and *salt*) organic, not mineral; that is, of *vegetable* or *animal* origin. Plants live on mineral food (as has been before said); animals, on plants or on each other. Lime is always obtainable from bones; but pure lime will not answer as food for us. Birds can peck a little of it, as it helps to make their shells. Infants sometimes profit by having limewater put with their milk; but that is rather medicine than food. We do not want to put lime in substance upon our tables. It is furnished *combined* with other things, in various articles of food, each giving a little; meat, bread, milk, vegetables, fruit; all *organic.*

Plants, under the sunlight, have a marvellous power (which we have not) of *working up* mineral matters from the soil and air into the organic state; animals take this ready-made "life-stuff," and modify it as their own organs and uses require. Literally, then, as well as figuratively, "all flesh is grass."

There would seem to be an exception to this, in the strange food of the *dirt-eaters.* Such people exist among the Indians of California and South America, and in Finland and other parts of Northern Europe. "Mountain meal" is a name given to earth, of which cart-loads are used by Lapps and Finns in times of scarcity. Ottomakas in South America are said by travellers to live sometimes for months upon earth-food. They then become thin, weak, and pot-bellied. There is a fascination in this habit, a morbid craving, which grows, like the taste for opium, tobacco, or alcohol.

But the *explanation* of the undoubted fact that earth can take, in part, the place of food, is, that it *contains some organic matter.* Retzius, of Sweden, proved this, with the microscope, in "mountain meal." All mould has in it remains of dead animals and plants, not yet quite

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mineralized; and, also, some living germs, at least, of plants and animals of low type. These are the *food* part of earth; and very poor food it is, at the best.

Thirdly, what we eat must be capable of being crushed or **broken up**; mechanically divided and reduced. Anthracite coal is nearly pure carbon; and carbon is an ingredient in all our food: but coal will not do in our diet, even though of "chestnut" size.

Fourthly, it must be **soluble** in some of the **digestive fluids.** Because it is not so, charcoal, although pure carbon, is sometimes a good medicine, but never an article of food. Other examples might be easily brought, if needful.

Fifthly, it must, of course, be **not poisonous.** We have no occasion to dwell on this point. Along with poisons may be named **parasites**; such as trichinæ (spiral thread-worms), tape-worms, and others. We avoid these, by eating only *well-cooked* meat and by drinking only *pure water.*

Lastly, food must be **not offensive to taste or smell.** Some exception must be admitted to this in times of shipwreck or famine. Men will eat *anything* rather than starve to death. Dreadful (and sometimes true) stories are told of those who, after shipwreck, have drawn lots to determine which of a boat's crew should be made food for the rest; and in besieged cities equally horrible things have happened. These are exceptions to all rules.

USES OF FOODS.

Already we have seen that these are two: to furnish material for **growth** and **repair of waste**, and to supply fuel to produce **energy**.* A locomotive, when wearing out, has to be repaired from the outside by the machinist. Our bodies are *self-repairing;* but the stuff from which they are made must be put into them for the purpose. Also, like the locomotive, we must have the fire supplied with fuel for keeping us *going*. External and internal work, that is, walking, laboring, talking, and also breathing, digesting, circulating our blood, and even thinking, consume this fuel; so that we need a great deal of it.

A farmer's pig may give us a lesson in Physiology. When about big enough to fill a bucket, the pig will eat in a day as much as the bucket will hold. Put him at night in the bucket he has emptied; then, what has become of the provender? Our answer has been contained in what has just been said. Part of it has been made into new tissues of his body, which has grown a little larger; the rest has been used up; oxidized, consumed as fuel, and given off in his excretions, from the lungs, skin, kidneys, and bowels,—of which account has been given in Physiology.

Heat is one form of energy always present in our bodies. Muscular *motor* energy is another. *Electricity* also can be detected by delicate instruments; the silurus and other electrical fishes have it abundantly. *Light* is given off by the fire-fly and glow-worm on land, and the sea-brightening *noctiluca* in the ocean. *Chemical* energy is constantly acting during our digestion and secretion.

It was once thought practicable to classify articles of food, according to their action in supplying material either for building up and repairing the *tissues*, or for generating *energy*. It is now understood that such classes of food-materials often overlap each other.

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* Energy is *force in action*. Force (as that of gravitation) is any *cause of change;* when it is *doing work*, we call it energy, and measure it by the work done. What is called *potential* energy is measured by the work which a certain stress of force, or composition of forces, *could* do, if a particular known condition were changed.

FOOD GROUPS.

Chemists have furnished the best arrangement of these, according to *what they are made of.* Eight groups of nourishing substances may be named:

1. **Nitrogenous** foods; that is, those containing *nitrogen, with carbon, hydrogen, and oxygen.*
2. **Oily** or **fatty** articles (containing no nitrogen).
3. **Starch-like** substances (also non-nitrogenous).
4. **Salts** (compounds chemically so called).
5. **Acids** of vegetable origin.
6. **Water,** as the universal solvent.

Albuminoids is a name sometimes given to the *nitrogenous* substances, because albnmen, of white of egg or of the *serum* of the blood, is one of the most important among them. In flesh there is *myosin,* also nitrogenous; in gristle and in jellies, *chondrin* or *gelatin;* in blood (besides albumen), *cruorin, globulin,* and *fibrin;* in brains, such as we have in calf's-head soup, *protagon* and *neurin;* in milk, *casein,* with albumen; in bread, *gluten.*

Lean meat, having in its substance myosin (or syntonin), and in its gravy albumen, cruorin, globulin, and fibrin, is eminently a nitrogenous food. So is the *gluten* or pasty part of bread; but bread contains also a good deal of starch.

Among these "food principles," **myosin** of flesh is probably the most nourishing; next in order, **albumen, globulin** and **fibrin, protagon** and **neurin, casein, gluten, cruorin,** and last, **gelatin.** This is, it is trne, not a very well settled order of tissue-making values. All of them help out in their way.

Casein is present in *cheese,* which consists almost entirely of it, solidified. Cheese is decidedly nourishing, *when digested.* But its toughness stands in the way of that; and it agrees with the stomach best in small qnantities. There is an old saying,—

> "Cheese is a surly elf,
> Digests all things but itself."

This means that a little (especially old) cheese at the end of a dinner promotes digestion. Chemically, old cheese, casein beginning to decompose, is exceedingly like *pepsin,* the active "fermenting principle" of gastric juice; and it *helps pepsin out* in its action when the dinner is rather much for it.

Several chemists have urged that *gelatin* passes through the body unchanged, and is worth nothing as food. This seems strange, when

we remember how large a place the gelatinous tissues have in our frame; all the gristly parts (nose, ears, eyelids, between the bones, ends of ribs, and *connective tissue* all over the body) being such. Experience shows that jellies are *not strong* food, and should never be depended upon alone; but they have some worth, especially for variety in diet with feeble and convalescent people.

AMOUNT OF NITROGEN.

	Grains per pound.
Cheese	300
Beef	184
Mutton	181
Oatmeal	136
Indian Meal	120
Seconds Flour	116
Baker's Bread	88
Rice	68
New Milk	44
Potatoes	22
Beer	1

Oily or **fatty** food is exemplified by butter, olive oil, and the fat of various meats. In these chemists find a number of definite substances; among which the main ones are *butyrin, olein, palmitin,* and *stearin.* The last named is the hardest at common temperatures, though easily melted by heat.

Oils and fats consist of *carbon, hydrogen,* and *oxygen;* no nitrogen. There is not (chemically speaking) a *satisfying* amount of oxygen in them for their carbon and oxygen. When heated and exposed to the air, they will take more oxygen and *burn;* that is, become rapidly oxidized and saturated with oxygen. In our bodies the same thing happens slowly, producing heat and other forms of energy. This is what is meant when we call them "fuel-food."

All over the world something oily is craved and taken as food. Arctic dwellers and explorers eat the most of it; but near the equator, also, Hindus have their *ghee* (a sort of butter), Egyptians buffalo butter, other Africans palm oil, Spaniards and Italians olive oil; while butter and lard are used among all the civilized nations.

There are important uses of fat in the body. First, it is, especially, *fuel-food* for the working power of all the organs. Then, stored up as fat, it rounds off the surface of the body, having much to do with its beauty; it cushions the muscles, bones, and some of the internal organs; and it is a natural clothing, keeping in our animal heat. Whales could hardly bear the cold of the North Atlantic, in which they swim, but for their thickness of two feet, more or less, of blubber. They are made lighter by it, also, so as to float more easily.

Very small quantities of oily material seem important for the digestion and appropriation of other food. Those who eat fat freely, or work in oils, as oilmen, cooks, butchers, tanners, appear to be less than others liable to consumption. Cod-liver oil, so often useful in this and other wasting diseases, is an *already assimilated* fatty material, and therefore more a food than a medicine. "Wine is good, but oil is better," says the peasant of Andalusia, as he gulps down a mouthful of olive oil.

An *excess* of greasy food is not wholesome; it promotes indigestion. Worst is fat which has been overheated in frying; when an irritant product, *acrolein* is educed.

Amylaceous is a big word for *starch-containing* or starch-like. All vegetables contain **starch**; cabbages and cauliflowers less than others; mushrooms also not much: they are almost as nitrogenous as meat. Besides starch, however, in the same group, are **sugar, gum, cellulose** (of leaves and lighter parts of plants), and **lignin** (of wood). These are all composed of *carbon, hydrogen,* and *oxygen;* the latter two elements being to each other in the proportion in which they exist in water. A *hydrate* is a compound of water with something; hence these substances are called **carbohydrates**; that is, water-compounds of carbon. They are, like oils and fats, most useful as *fuel-foods.* Being, in the body, also convertible into fat, they contribute much towards the deposit of fatty tissue, which, when great, is called obesity. Persons growing too fat do well (like the celebrated William Banting) to avoid vegetables, especially potatoes, almost altogether; as well as sugar, butter, milk, and fat meat. By arranging his diet upon such a view, Banting reduced his weight in a few months from 200 to 150 pounds.*

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* As a curiosity, this gentleman's *thinning down* dietary may be here given, as stated in his pamphlet on the subject:

"For breakfast, I take four or five ounces of beef, mutton, kidneys, boiled fish, bacon or cold meat of any kind except pork, a large cup of tea (without milk or sugar), a little biscuit, or one ounce of dry toast.

"For dinner, five or six ounces of any fish except salmon, any meat except pork, any vegetable except potato, one ounce of dry toast, fruit out of a pudding, any kind of poultry or game, and two or three glasses of good claret, sherry, or Madeira (!)—champagne, port, and beer forbidden.

"For tea, two or three ounces of fruit, a rusk or two, and a cup of tea without milk or sugar.

"For supper, three or four ounces of meat or fish, similar to dinner, with a glass or two of claret.

"For night-cap, if required (!), a tumbler of grog (gin, whisky, or brandy, without sugar), or a glass or two of claret or sherry."

Leaving out all the claret, sherry, Madeira, gin, whisky, and brandy, which are totally misplaced in any diet for health, this régime appears to be quite well adapted to its purpose.

As an example of the use of starchy and fatty articles of food to get up and sustain energy under hard work, we may mention the habit of chamois hunters on the Alps, of going for days together, during their expeditions, with bacon fat and sugar for their only food. Dr. Radcliffe says:

"I once made the ascent of Etna with two Sicilian guides, who scarcely ever tasted any animal food except a morsel of fat bacon, and who lived chiefly on polenta * and bread and olive-oil. More than once I thought I should never get to the top; they trudged upwards with scarcely a sign of distress, though often pulling me up."

But it is important to remember that neither starch nor any of its group can alone make or repair our tissues; since all the tissues, except fat, contain nitrogen. Babies are sometimes fed with arrow-root; if it be made with water, not milk, they will *starve to death* (some babies have no doubt done so) upon it, in a few days, if no other food be given them. *Milk* with it makes it sufficiently nitrogenous for tissue-making and repairing.

Gum-water (made with gum-arabic) is not at all suited for use as an article of food. It is said that Arabs in crossing the desert travel far with nothing but a stock of gum-arabic for food on the way. This seems not likely to be true. They may probably go for a day or two upon it, as the chamois hunters do upon the Alps, with bacon fat and sugar as diet. But in both these cases some nitrogenous food (milk, meat, or bread) must be taken at intervals not very long.

When only moderate exercise is undergone, the force or energy for it is supplied by the consumption of fuel-food in the blood. But in unusual efforts, as when a Weston, a Rowell, or a Fitzgerald walks a hundred miles in twenty-four hours, the blood-fuel runs out. Then the very substance of the tissues is called upon and consumed for fuel. It is like what is done by the captain of a Mississippi steamboat in a race; to hurry up steam, when his coal or wood is exhausted, he will pitch parts of his cargo, or whatever lies near, into the fire. The measure of tissue-waste in the body is, the *amount of nitrogenous matter* (especially urea and urates) in the excretions. Two physiologists, Fick and Wislicenus, on climbing an Alp, found the amount of such excreted material no greater than during a day of quiet at the foot of the mountain. Dr. Flint, of New York, found it quite otherwise with Weston, during one of his great pedestrian exploits.

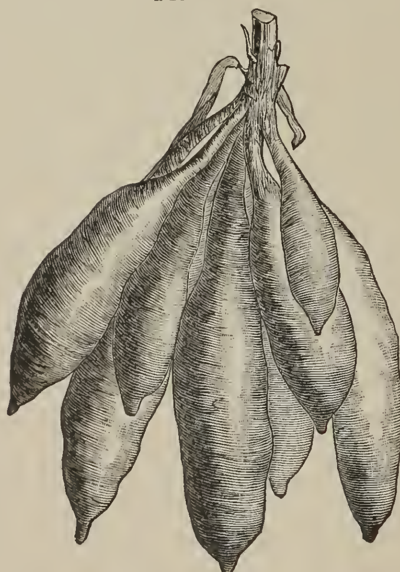
Varieties of starch in common use are *potato, corn,* and *wheat* starch, *arrow-root, tapioca,* and *sago.* The last three are employed for the sick;

* Polenta is a kind of flour; sometimes toasted barley-meal.

tapioca and sago also for puddings. They are very *soothing* to the stomach and bowels, and are especially suitable in diarrhœa and dysentery. Corn-starch is almost as delicate; wheat next, and potato-starch the least agreeable in its effect.

Potato-starch is often added to arrow-root (Bermuda arrow-root is the best) as an adulteration. It may be detected by the microscope. All starch is naturally formed of very small rounded grains or *corpuscles*, made of concentric layers, like an onion. These corpuscles are of different sizes and shapes in starch from the different sources above named. Those of potato-starch are *meal-bag shaped*, or somewhat

Fig. 136.



TAPIOCA ROOTS.

like an oyster; and many of them are larger than any of those of arrow-root.

Sugar, like starch, is a *food;* it is not only a condiment, although we take it commonly for its taste rather than its use. In moderation, it is not unwholesome. Children are very fond of it; but the sugar-bowl, when forbidden, is more dangerous to their morals than to their stomachs. I have known a child, much run down by disease, to be built up in a few weeks by eating plenty of rock-candy along with its milk.

Of course, constant use of sweets *cloys* and weakens digestion. It makes the child swallow more food than it has need of. Bread and molasses are therefore not always wholesome as a supper diet; at least

Fig. 137.

ARROW-ROOT STARCH CORPUSCLES.

Fig. 138.

POTATO-STARCH CORPUSCLES.

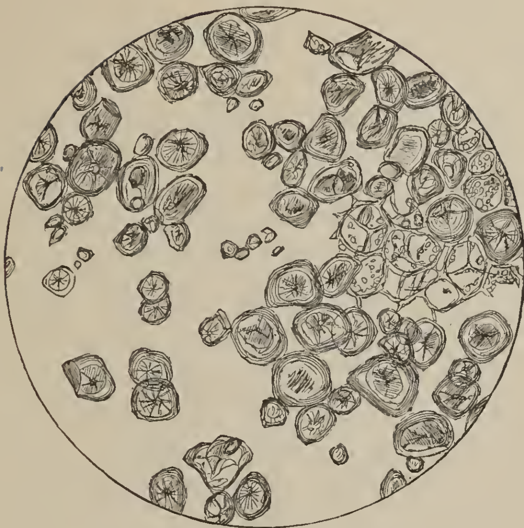
FIG. 139.

WHEAT-STARCH CORPUSCLES.

FIG. 140.

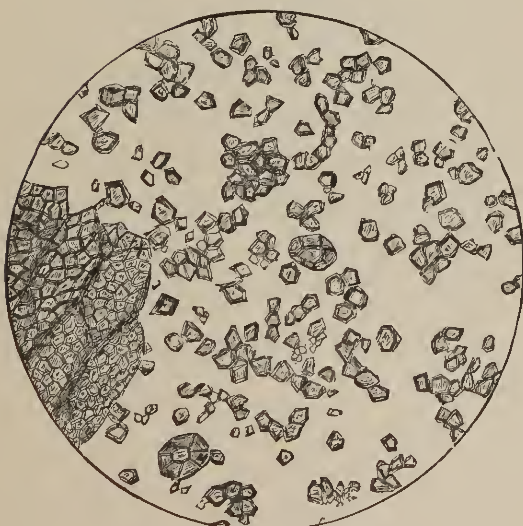
RYE-STARCH CORPUSCLES.

FIG. 141.



INDIAN-CORN-STARCH CORPUSCLES.

FIG. 142.



RICE-STARCH CORPUSCLES.

not every night. Cakes, moreover, and sugar-plums have indigestible qualities not dependent on the sugar they contain.

Sugar is a fuel-food, and a fat-producer also. West India negroes are said to grow fat always about cane-pulling time. Bees, fed on honey, form wax in their bodies; and wax is a kind of condensed fat.

Of the several kinds of sugar, natural or made by chemists, we may notice two: **cane** sugar and **grape** sugar. The first is present in the sugar-cane, sorghum, beet-root, maple-sap, Indian corn, and dates. Grape sugar (glucose) exists not only in the grape, but in several other fruits and in honey. It is also often artificially made, and used as a cheaper substitute for, or adulteration of, cane-syrup.

Fig. 143.

YOUNG AND EGGS OF SUGAR MITE (ACARUS SACCHARI) MAGNIFIED.

Cane sugar will *crystallize* (as in rock- candy) but will *not ferment*, except after being first changed to grape sugar. Grape sugar does not crystallize, but will ferment. *Cane* sugar is much the *sweeter* of the two.

Brown sugar is unrefined; coarse and sometimes impure. Poor qualities of it are not as cheap for use as white sugar; they contain a good deal of water, adding to the weight, as well as dirt. Sometimes brown sugar has in it a multitude of minute creatures, *acari*, which, when it is much handled, produce "grocer's itch." Robert Nichol asserts that he has found a hundred thousand of these in a pound of brown sugar.

There is no objection either to beet sugar or maple sugar, if well purified, on the score of health. Beet sugar is largely used in France

and some other parts of Europe, and rather increasingly in this country. Maple sugar is made quite extensively from the sugar-maple in our Northern States; Vermont, New York, Michigan, Ohio, Pennsylvania, New Hampshire, Indiana, Massachusetts, and also in Kentucky.

Glucose or grape sugar is not unwholesome. Its being sold for cane sugar or syrup is a fraud, because the former is so much less sweet; but otherwise it does no harm.

Honey is too cloying to eat in much quantity. Occasionally it has been made dangerous by the bees having sipped it from poisonous flowers. Xenophon, the Greek historian, tells of this having happened to some soldiers during the famous retreat of the Ten Thousand.

The sugar found by chemical tests in the urine of patients having the disease called *diabetes mellitus* is almost, if not exactly, identical with grape sugar.

Glycerin, though sweet, is not of the same nature or composition as sugar; it is, chemically, rather more like alcohol.

Many persons suppose that sugar promotes *decay of the teeth.* I believe this to be a mistake. It has no action on sound teeth; but, on getting into a tender *hollow* tooth, it causes pain in it. This has produced the impression that it injures the teeth. It also gives pain in the stomach, when that organ is *ulcerated.*

Adulteration of sugar is most practised with *pulverized fine white sugar.* Marble and chalk are sometimes put into this. To find either of these in it, drop a pinch of it into a glass of pure water. If, on stirring, a part of the powder *will not dissolve*, it is no doubt a mineral substance. The *granulated* fine sugar is much less often adulterated; and the same is true, of course, of lump or loaf sugar.

Cellulose and **lignin**, the fabric of leaves, stems, and wood, serve as food for multitudes of animals, from the grubs of beetles and still smaller creatures up to the beaver, the giraffe, and the elephant. Beavers cut bark and wood with their strong front teeth, and store it away for winter use. An elephant will, as I have seen it doing, chew up and swallow a piece of kindling-wood as if it were a crust of bread. Human beings are not naturally wood-eaters, but in times of famine they sometimes become so. Beechwood sawdust has thus, in Northern Europe, been made into bread, to keep off starvation.

It is the *hardness* of wood, and its not being *soluble* in water or in our digested fluids, that make it indigestible. We take, in bran bread, a certain amount of chaffy matter, which is woody in nature. There is an advantage in this, when the stomach and bowels are torpid; the roughness of the particles stimulates the muscular coat of the alimen-

tary canal, and aids in keeping the bowels open. "Graham bread" is, partly for this reason, advised for dyspeptics. Late careful observations, however, especially by Drs. N. A. Randolph and A. E. Roussel, of Philadelphia, tend to lessen somewhat our confidence in the judiciousness of this.*

Force-Food.

Required to lift a man 10,000 feet.

Beef-fat,	ounces,	8.9
Butter,	"	11.1
Oatmeal,	"	20.5
Rice,	"	21.5
Boiled Eggs,	"	35.3
Bread,	"	37.5
Lean Beef,	"	56.5
Potatoes,	"	81.1
Milk,	"	128.3
Cabbage,	"	192.3
Ale,		Nine bottles.

Saline substances, except common *table-salt*, are not taken separately, but are naturally contained in our articles of food. Meat and gravy, as well as milk and vegetables, all possess some of them. So, also, does our drinking-water. Chemists give the name of *salts* to compounds of a neutral character, whose bases usually are metallic. Some of them

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* These are their conclusions: "From the facts, old and new, which have been presented, the following deductions appear to us justifiable:

"I. The carbohydrates of bran are digested by man to but a slight degree.

"II. The nutritive salts of the wheat grain are contained chiefly in the bran, and, therefore, when bread is eaten to the exclusion of other foods, the kinds of bread which contain these elements are the more valuable. When, however, as is usually the case, bread is used as an adjunct to other foods which contain the inorganic nutritive elements, a white bread offers, weight for weight, more available food than does one containing bran.

"III. That by far the major portion of the gluten of wheat exists in the central four-fifths of the grain, entirely independent of the cells of the fourth bran layer (the so-called 'gluten cells'). Further, that the cells last named, even when thoroughly cooked, are little, if at all, affected by passage through the digestive tract of the healthy adult.

"IV. That in an ordinary mixed diet, the retention of bran in flour is a false economy, as its presence so quickens peristaltic action as to prevent the complete digestion and absorption, not only of the proteids present in the branny food, but also of other food-stuffs ingested at the same time; and,

"V. That inasmuch as in the bran of wheat as ordinarily roughly removed, there is adherent a noteworthy amount of the true gluten of the endosperm, any process which in the production of wheaten flour should remove simply the three cortical protective layers of the grain, would yield a flour at once cheaper and more nutritious than that ordinarily used."

have but *two elements*, as common salt, *chloride of sodium*. Others are composed of an *acid* and a *metal*, as *phosphate of calcium* (formerly called phosphate of lime). There are, then, different groups of salts—*chlorides, phosphates, sulphates, carbonates*, and others; that is, compounds of *chlorine, phosphoric acid, sulphuric acid, carbonic acid*, with *calcium, potassium, sodium*, and *magnesium*. All these are, in small quantities, in our food and drinking-water; and all of them pass through our blood, being there built up into the tissues; in the wasting of these, being thrown out in the *excretions* from the kidneys, skin, and bowels. A portion of them goes into the excretions as mere refuse, not first entering the tissues; some not even reaching the blood.

What is the *use* of the salts of our food? This is not quite certainly all made out. Probably some of them make the blood more capable of absorbing and holding carbonic acid, which acid gas is one result of tissue-waste, so as to give it out, in exchange for oxygen, in breathing. Table-salt (chloride of sodium) yields chlorine for *chlorohydric* (muriatic) *acid*, as a part of the gastric juice. Sodium is present also in the bile.

But there is reason to believe that some of these salts have a particular usefulness in promoting chemical changes, belonging to assimilation and nutrition, which are not yet fully understood. Plants are, in farming and gardening, known to be helped in growth by adding *phosphates* (salts of phosphoric acid) to the soil in which they are cultivated. Yet the amount of these phosphates really making a part of the substance of the plants is very small. So, in animal bodies, an *influence* may be exercised by the salts far beyond their importance otherwise in any of the structures or secretions in which they are present. Liebig's extract of beef, by the manner in which it is made, is deprived of the *albuminoid* substances of the meat, but contains a large proportion of its salts. It is, therefore, not a perfect article of food for nourishment, but a *stimulant* to the assimilating powers of the body, making other food go farther towards the support of strength.

Acids in food are often so combined with alkaline or earthy bases (potassium, sodium, calcium) as really to make salts; but the acid in these is more than enough to saturate the base; they are *acid salts*. In lemon-juice and orange-juice they are so combined. *Vinegar* is a free acid (acetic acid) dissolved in water. It comes from a change which alcohol, in wine or cider, undergoes when kept for some time exposed to the air.

The acids present in our food are the following:

Acetic acid, in vinegar.

Pectic acid, in apples, pears, quinces, cherries, blackberries, raspberries, strawberries, oranges, tomatoes, carrots, beets, and turnips.

Citric acid, in lemons, limes, oranges, and unripe grapes.

Tartaric and *Racemic* acids, in ripe grapes.

Malic acid, in apples, pears, and quinces.

Lactic acid, in sour milk and buttermilk.

A *little* acid, from time to time, in our food is not only pleasant but wholesome. Much of it at once disagrees with many persons. Singular as it may seem, acidity of stomach from indigestion is sometimes relieved or diminished by the moderate use of acid fruits; especially currants. This is, no doubt, due to the healthy stimulation effected by the latter; probably increasing the flow of gastric juice. One man, to my knowledge, has often been cured of "sick headache" by taking a wineglassful of pure vinegar at a single draught.

VEGETABLE AND ANIMAL FOOD.

Are *vegetarians* right, who insist that we should eat no meat at all? Their argument is, that vegetables contain all the elements required for our nourishment, made up into organic stuff, ready to be digested and built up into our tissues and used as fuel. Hence, they say, it is useless, cruel, and expensive to slay our subject animals to gratify our carnivorous taste.

True, plants, roots, seeds, and fruits do contain everything absolutely necessary for food. Men often live for years, many perhaps (after infancy) for lifetimes, without animal food. But that is not the whole question. Is a solely vegetable diet the *best* for *health* with *all people?*

On this we must inquire further: are the elements in exactly the *same state of combination* in vegetables as in meat? Our answer is, no. They are more *concentrated* in animal flesh, are worked up already into animal substances, and therefore are more *readily assimilated* than vegetable food. A sheep's or an ox's digestive tube (including the four stomachs) is more than twenty times as long as its body. That of a cat or a dog is about three or four times its body's length. The ox, sheep, and horse have to chew their food all up small, either at the first or (with the cud chewers) the second swallowing. A dog, a cat, lion, vulture, shark, or anaconda will swallow meat without any chewing in pieces torn from their victims' bodies, or else will bolt them whole! Such is the difference in the *ease of digestion* between vegetable and animal food.*

Can we judge by anything in our *structure* which we are best fitted for? Flesh-eating beasts, as lions, cats, dogs, have *only* sharp, cutting, and tearing teeth. Grass-eaters have nippers in front, and all the back teeth broad-crowned, nearly flat. We resemble the bear, hog, and rat, in having teeth for cutting in front, tearing (canines) at the sides, and broad, nearly flat, grinders back in our jaws.

The length of the human alimentary canal (that is, stomach and intestines) is about six times that of our bodies; intermediate between that of the purely *carnivorous* and of the entirely *herbivorous* animals. It would seem then that, like the bear, hog, and rat, we are made fit for *either* animal or vegetable food. We are *omnivorous,* like them.

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* When a house-dog learns to eat bread or other vegetable food, he has sense (or instinct) enough to know that he must *chew* it before he swallows it; he does not gulp *it* down like meat.

What does experience say about it? Scotch Highlanders, the Irish, the peasantry of Italy, Spain, and Portugal, Hindus, Chinamen, and multitudes in Africa, thrive on oatmeal, potatoes, corn, chestnuts, olives, rice, or lentils, with little or no meat. In Scotland, a mountaineer will walk thirty or forty miles a day on oatmeal porridge, with, perhaps, milk. An Indian palanquin-bearer carries his burden twenty-five or thirty miles a day, with only two meals of unleavened cakes and a little *ghee*, a sort of butter. Swedes, Norwegians, Danes, Dutch, Germans, Russians, live to a great extent (the poorer classes, that is) on rye bread and other vegetable food. Chinamen will do more work for their money, and cost less to keep, than Americans and Europeans, their principal food being rice. All this looks very well for the vegetarian side.

But, again, the Eskimos subsist most of the time wholly on animal food. So do the fishing population of the coast of Norway, and the *Pecherais* of the southern end of South America. For months the hunters of the American pampas have no food but flesh of animals they kill; and *pemmican*, a preparation of dried meat and fat, answers for the furriers of the North-west through long expeditions. Setting these against the other facts, it appears that *either* vegetable or animal food *will do* for men to live upon.

Still we have not got to our conclusion, which, or what, is the *best* diet for all. We must obtain the facts for this from the accumulated experience of men under various circumstances. It is known that the Chinese and Hindus, rice-eaters, are not superior races. Neither are the flesh-eating Eskimos, nor the fish-eating Pecherais of Terra Del Fuego. When the East Indian rebellion against the English occurred, some years ago, the hardest fighters among the Hindus were the Sepoys, who had been trained under the English to use a mixed diet.

On the whole, this is the conclusion to which physicians and sanitarians have generally come—that, with healthy people, living in the open country, not working very hard, and having an abundance of good vegetable food, meat is not necessary. They can live long lives without it. But, in close-built cities, where the air is not pure, where work is hard, and "vexation of spirit" abounds, a *mixed diet is best.* Although, in this country, we probably eat more meat than we need, or than is good for us, yet some of it, every day, is wholesome for nearly all. Were London, New York, or Philadelphia, for one week, deprived of butchers' meat, poultry, and fish, more deaths would occur, and many, especially *brain-workers*, would suffer considerably in strength and comfort.

Should *children* eat much meat? Why not as much, in proportion,

as adults? One of the *anti*-vegetarian arguments is, that nature's first food for every child is *animal* food—milk. Young birds are often fed with worms, although, on growing up, they live altogether on seeds or fruits. Children, it is true, when well, have good appetites and digestive powers. They can, therefore, grow and get fat on any kind of wholesome food, and may be quite well, generally, without meat. But *feeble, delicate* children, who make blood slowly, should have plenty of animal food. Even in infancy this is so. I have known a baby, a year old, which could not digest milk, to take daily for a long time the substance of a pound of beef, in beef-tea, and thrive upon it. At the same time, it must be said to be quite probable that, after as well as during childhood, half as much meat as is now commonly eaten would be better for most persons in this country. The condition of body called *plethora* is met with not unfrequently in youth, as well as in later life; although it is subject to greater danger in old persons.

BREAD.

Time out of mind "the staff of life," made of *brayed* grain by our ancient forefathers before they left Western Asia, bread contains nitrogenous and non-nitrogenous food principles; gluten and starch, as well as salts. It is adapted both for tissue-building and for energy-producing use in the body.

Wheat bread is as strong in nitrogen as any, and is richer than other kinds in phosphates, which are supposed to be in part nerve-feeders. The *whitest* of flour does not make the most nourishing bread. The richest part of the grain is just beneath the chaff, making slightly yellowish flour. Improved ways of grinding wheat now retain nearly all of this strength of the flour, some of which was formerly wasted or left with the bran.

Rye meal makes, by itself, a nourishing but less spongy bread than wheat. It is very largely eaten by people in Northern Europe. The best way to use it in making bread is to mix it with an equal or less quantity of wheat flour.

Bread must be properly *raised* to be good. This is done by a *fermentation*, which takes place in the starch (it first becoming changed to sugar) of the dough, under the action of yeast. Sugar, when it ferments, is converted into *alcohol* and *carbonic-acid gas*. The alcohol is very small in amount. The carbonic-acid gas is kept in by the sticky, pasty *gluten*, of which good flour has about twelve per cent. Thus the dough is stretched or expanded into a spongy mass. *Baking* dries it somewhat, and makes it more or less crisp, or at least takes away the adhesiveness of the dough.

Faults of bread, which make it less wholesome, as well as less agreeable, are *heaviness, sourness, bitterness, mouldiness*, and an excess of *saline* material. Heavy, ill-raised, and under-baked bread is very unwholesome. Sour bread is so also. It is made by *over*-raising, or by using spoiled flour. Bitterness comes either from bad yeast or too much of the yeast being used; mouldiness, from the flour or bread being kept too long. Saline bread is often made, especially in New York and New England, by using too much *cream of tartar* and *soda** to raise the bread. The resulting compound (Rochelle salt) makes the bread less easy to digest.

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* Cream of tartar contains tartaric acid combined with potassium; cooking-soda consists of sodium with carbonic acid. Part of the tartaric acid combines with the sodium, *setting free* the carbonic-acid gas, which expands the dough.

Other ways of raising bread are: using *salæratus*, bicarbonate of potassium, from which the carbonic acid is set free by warmth, or by adding sour milk, containing lactic acid; or putting in the dough sour milk and bicarbonate of sodium; or carbonate of ammonium (smelling salt); or phosphoric acid and bicarbonate of sodium (Horsford's process). Still another plan is to make the carbonic acid as it is made for "mineral water," and then by pressure to force it into the dough. This constitutes "unfermented aerated bread." When carefully made, it is very good, keeps well, and can safely take the place of ordinary bread.

Unleavened bread, not aerated, such as the Israelites use at the time of the Passover, is less agreeable than good light bread; but it is not unwholesome. Crackers and hard biscuit are chiefly peculiar in being long or repeatedly baked, so as to become dry and hard. Good fresh crackers, well chewed, are wholesome enough.

Hot fresh bread has a somewhat more adhesive or pasty quality than stale bread. The gastric juice, therefore, does not so readily penetrate and digest it. Persons with entirely sound digestion have no trouble in disposing of it; but dyspeptics should always prefer stale bread.

Fig. 144.

MEAL MITE (ACARUS FARINÆ) MAGNIFIED.

Poor or spoiled flour, of course, will not make good bread. The quality of flour is best shown in the baking. If good, however, flour is white, with a slight tinge of yellow; not lumpy, any lumps in it giving way at once on pressure; not gritty, as that shows change in the starch-corpuscles, and sourness is apt to result; when compressed in the hand, it should hold together and show the prints of the fingers well. When thrown against a wall, some of it should stick. Good flour makes an elastic dough, which can be drawn out long without breaking.

Flour long kept is sometimes found to have *weevils* in it. These are not poisonous, but they consume some of the strength of the grain, and, of course, are not pleasant. Another live creature, the *acarus farinæ*, something like the sugar mite, is also not very uncommon in flour.

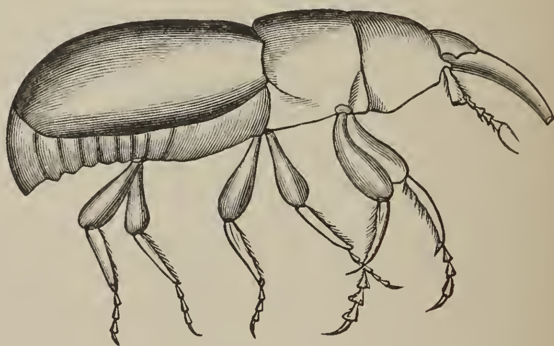
Adulterations of flour are most often alum, chalk, lime, and potato meal. A little alum is frequently put in by bakers to whiten the bread, as well as to make it weigh more when sold by the pound. Much alum makes it unwholesome, irritating the stomach and binding the bowels. Potato meal is harmless, but a fraud when mixed with wheat flour, as it costs much less, and is not so nourishing. The microscope will detect it. (See previous pages, on *Starch.*)

Bran bread (as before remarked) is rougher than that of white flour, and so, by stimulating the muscular coat of the bowels, it helps to keep them open. **Rye** bread is about as nourishing as wheat. **Oatmeal**

Fig. 145.

WEEVIL—NATURAL SIZE.

Fig. 146.



WEEVIL—MAGNIFIED.

does not rise so well as wheat flour, but in cakes, porridge, gruel, and grits, it makes an admirable food.

Buckwheat is nourishing, but proves to be rather better suited, in buckwheat cakes, for an occasional luxury than for a stand-by diet. **Barley** is not a strong meal, though "John Barleycorn" makes a very strong drink when fermented and distilled. Barley water is often a good addition to milk when it disagrees with young infants.

Rice contains but a moderate amount of nitrogen, but plenty of starch, and (like other grains) some salts; and it is very easily digested. Chinamen and Hindus, many millions of them, live chiefly on it. It is soothing to the bowels, and particularly suitable in cases of diarrhœa.

Corn (maize), so much used in this country and in Southern Europe, is fairly nitrogenous, and is comparatively rich in fat. It affords good and serviceable food, whether eaten from the ear (sugar corn, boiling ears) or made into bread, mush, or gruel. It is not, however, quite so easily digested as wheat, oatmeal, or rice.

VEGETABLES.

Peas and **Beans** are highly nitrogenous, besides containing a great deal of starch. But that their share of salts, especially phosphates, is less, and that they are more uncertain of digestion, they would rank along with wheat bread in value. Indeed, under some circumstances, as on long voyages, dried peas and brown beans are more available than bread. During the Franco-Prussian war of 1870, *erbswurst*, the main food of the German soldiers, was made of pea-meal and bacon-fat, seasoned, pressed into skins, and boiled. It was easily carried, and enabled them to bear much fatigue.

What we call the Irish **potato** is really of American origin. It has been found growing wild in South America and in Arizona. Abounding in starch, potatoes contain but little nitrogen. Their great merit is, that they produce largely for their cost; they can be made palatable by cooking, and go a great ways in bulk as food. Ireland, however, has suffered much from depending on the potato for food; a year of blight has, several times, caused a severe famine.*

The **sweet potato** is an Old World plant, known long before the discovery of America. It is harder to keep than the round or white potato, easily undergoing a sort of sugary decay. At the best, it is not quite so easily digested as the round potato. The *yam* of the East and West Indies is a root somewhat analogous to the sweet potato, and another similar root is a good deal eaten in the Sandwich Islands.

The **tomato** is really a *fruit.* It is more nearly always wholesome for everybody than any other of what we call vegetables. **Turnips, carrots, parsnips,** the **onion, cabbage, squash,** and **salsify,** all rank below potatoes and tomatoes in digestibility. Those of us who never need to remember our stomachs can eat them all (not at one meal) and enjoy them safely. Rules about diet are for the weaker brethren; like the law of old, they come in "because of transgression."

Cauliflowers and **cabbages,** as well as **broccoli,** are plants of the same species, differently developed. But the cauliflower is, under cultivation, much the most tender and digestible.

Beets, when young, are very easily digested; quite otherwise after they grow old and tough. **Asparagus,** of the best quality, is entirely wholesome. It is notable for the transmission of its odorous principle

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* The *stock* of potatoes ought to be renewed every few years by seed cultivation. When very long raised only from the "eyes" of the tuber, they degenerate. This is in accordance with the laws of physiology in regard to bisexual plants.

through the kidneys into their excretion. **Spinach**, in good condition, is not at all indigestible.

Mushrooms are strong and meat-like food, wholesome for most, but not for all people. The point of importance is, to be sure *they are* mushrooms. A number of other *fungi* (the *truffle* of Europe, for example) are safe and nourishing, but some are very poisonous. Never gather or eat what are called mushrooms unless they have, underneath, pink gills, so called, and above, as well as on the stem, a skin which can be easily peeled off; also, they have no unpleasant taste or smell, and grow not in dark woods, but in rather open fields.

Celery, when white and tender, is, in moderation, very wholesome, either raw or stewed. It represents, when eaten raw, a class of food articles (the radish and lettuce are others) of more importance than is generally appreciated. We need, every few days, to take something in its natural state, which has "never seen the fire." *Why* this is the case, chemists as yet have failed to explain. But we find this need of the system proved by the harm done when, for a long time, *fresh* food, both animal and vegetable, is withheld. Arctic explorers, ships' crews on long voyages, and armies on campaigns away from their homes, have often suffered badly from *scurvy*. Captain Cook, in his celebrated voyages around the world, found out the reason for this: it was *the want of fresh food*, especially of fresh vegetables. Providing his ship, from time to time, with these, he and his men escaped the disease.

Scurvy is an affection which begins in the blood. From a change in its qualities, the whole body generally suffers. The gums swell and bleed easily, the legs also become swollen, the heart beats too quickly, the appetite and digestion give out almost entirely. The patient loses flesh and strength, and may die, if not relieved of his malady. This is regular scurvy. But modifications of it also happen. Sometimes it is mixed up with other ailments, especially of the bowels. During the Crimean war the French and English soldiers were often troubled with *scorbutic dysentery*. The same thing occurred in General McClellan's army in its campaign in Virginia, during our Civil War. In both of these instances the men were deprived of fresh vegetable food for many weeks, even months, together. When, on being taken from camp to the hospitals, they got vegetables and fruit to eat, most of them rapidly recovered; a few were too far gone, and died. Fatigue and exposure, of course, make all cases of scurvy worse.

Experience shows that, in the absence of *fresh* vegetables, *dried* potatoes will do, and that lemon-juice, or lime-juice, or oranges, will answer for a considerable time to keep off scurvy, but not indefinitely. In

the Arctic regions *raw* meat, frozen, was found to be, for this purpose, better than cooked fresh meat, and very much more *antiscorbutic* (preventive or curative of scurvy) than salt meat. Some plants, not commonly used as food, are antiscorbutic, as the leaves of the *maguey* plant, a wild cactus, in New Mexico and other places on our continent; the *pokeberry, sorrel,* and some others. Nordenskiold found a wild plant far up in the Northern latitudes, which rendered this service during his remarkable voyage around the frozen borders of Europe, some years ago.

Physiologists and chemists have endeavored to discover what peculiar principle fresh vegetables contain that is so needful to health, but, so far, in vain. No medicine, and no substance that can be separated from plants or fruits, has been found capable of taking the place of fresh food. We must, at present, confess that nature is too subtle for so close an analysis, and, like Captain Cook, simply mind the lesson of experience. No diet is good which does not contain, *every day,* some *fresh* vegetable article: and, every few days, a *portion* of our vegetable food should be taken *uncooked.*

Here we may emphasize another principle: **variety** in food is good for health. Not that we need to take many things at the same meal or on the same day. Each meal may consist of but two or three things; but *from day to day* we should vary them. This is not a mere matter of taste or pleasure. Monotony of diet is really unwholesome.

Starch food alone does not long support life, because it has in it no nitrogen. But Dr. Hammond found that when, for days together, he ate only *whites of eggs,* he began to starve; yet they are nitrogenous. Dogs have been fed for weeks on fibrin of blood, or on syntonin or myosin of flesh, alone; but they wasted, on such food, to death.

Hence we gather the law of diet, that *no one* food-principle will suffice alone to keep the body in health. We require, almost or quite every day, articles of at least *two* of the three groups of food-principles: *nitrogenous* or albuminoid, *oily* or fatty, and amylaceous or *starch-like.* Fat meat furnishes two of these; the nitrogenous flesh and the fat. Bread and butter give (1) nitrogenous *gluten,* (2) amylaceous *starch,* and (3) oleaginous *butter.* Milk also contains representatives of all three groups, and it is therefore a perfect natural food. Of this, more presently.

Here may be mentioned the composition of some of the popular "foods" manufactured and sold for infants and for the sick. Farina, maizena, and revalenta are all starch; maizena is pure corn-starch, and revalenta is a weak preparation, professedly of arrow-root. Cerealina (Moxey's, Philadelphia) is flour of the whole wheat, without the bran.

Hard's food, as well as Blair's, Hubbell's, Ridge's, and Imperial granum, are made from selected wheat flour. Nutrina and papoma, also, are preparations of *roasted* flour. Nestle's food for infants is a milk food. Mellin's food is a soluble dry extract of wheat and malt. This, along with Hawley's, Horlick's, and Savory and Moore's foods, are called "Liebig's foods." They contain but little nitrogen, and their starch is partly or entirely changed to glucose (grape sugar).*

Of all of these articles it may be said, that they should not be thought of as substitutes for fresh milk under ordinary circumstances. When good milk cannot be obtained, or is not well digested, one or other of them may be tried; and sometimes advantage results, with a delicate child, directly from *change of diet.*

* Carnrick's "Soluble Food for Infants" probably resembles mother's milk more closely than any other artificial preparation.

FRUITS.

As a rule, *fresh fruits are wholesome.* They promote the natural action of the bowels, and are refreshing and antiscorbutic. When the bowels are disordered, as in diarrhœa or dysentery (except when these result from *scurvy*), they are not suitable. Certain people, moreover, find particular fruits to disagree with them; but this sort of *idiosyncrasy* (personal peculiarity) may occur with regard to any or all kinds of food.

Exception as to eating fruits has been supposed to be proper at a time and place where *epidemic cholera* is prevailing. But there is no good ground for this idea. Cholera (not the same disease with our common *cholera morbus*) is a malady of the *whole system.* The bowels are affected in it, but the disease does not begin, so to speak, in the stomach and bowels.* You can be best protected against cholera, if obliged to stay where it has broken out, by keeping the body in its *best possible condition.* This is done by moderation of living in all respects, with the usual variety of healthy food, including fruits. In 1832, when cholera visited this country, my father, Dr. Joseph Hartshorne, allowed his family to eat everything ordinarily wholesome—corn, watermelons, canteloupes, and all, except cucumbers. None of us had the disease except himself, and his attack was promoted by the fatigues and anxieties of a very large practice. In 1849, 1854, and 1866, I acted upon the same principle of careful liberty in diet during the presence of the epidemic, and saw nothing to change my mind as to its correctness and safety.

All fruits are not equally digestible or desirable for persons of uncertain health. *Peaches, apples,* and *oranges* come the nearest to being good for everybody while in health; and oranges, as well as the finer and more delicate kinds of *grapes,* are often with advantage allowed to the sick. Many grapes have a tough pulp, which ought not to be swallowed; and the seeds never should be. They, and apple cores, and even cherry-stones, are often taken into the stomach, with no harm following. But they are not digestible, and now and then they collect together and cause obstruction. There is a queer little offset to the large intestine (see **Anatomy**), into which, in a few instances, an apple-seed or some such thing has found its way, producing an inflammation ending in death.

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* I am aware that the famous Dr. Koch, discoverer of what he calls the "cholera bacillus," takes a different view. But quite too much confidence has been placed in his hasty and unsustained conclusions about cholera.

Not enumerating all the fruits, each in its season giving zest to the enjoyment of our daily fare, the *least* wholesome of our domestic kinds may be said to be the *cherry*, and, doubtful for all dyspeptics, also, *pears;* of foreign fruits, *figs* and *pineapples*. *Prunes* (partly dried plums), *figs*, and *dates* are especially laxative to the bowels.

Idiosyncrasies (before alluded to) are more apt to occur about fruits than with any other kind of food. Some persons always have colic after eating watermelon; others are sure to break out with nettle-rash if they taste strawberries. It is for such persons to find out their own special liabilities, which make no rule for others.

Stewed fruits are far less uniformly digestible than the same eaten fresh, in season. *Preserves* ought to be ruled out of the diet of dyspeptics, and taken, as a rare indulgence, in small quantities only, by all. *Lemonade*, made with the juice of lemons (not citric acid of the drug-shop), is not only refreshing but beneficial to most persons in hot weather, and when sick with fever. But, in the last case, irritability of the stomach or bowels may sometimes be in the way of its use.

Canned fruits, put up with skill and care, may approach very nearly to fresh fruits in wholesomeness; but the skill and care actually used are often far from perfect. Moreover, of the different materials employed for keeping fruit or other food for a long time, the safest and best, undoubtedly, is *glass*.

EGGS.

Protoplasm was defined in our **Physiology** as the *building-up* material of the human and every other body, animal and vegetable, which has life. It varies in some qualities with every kind of plant and animal; but, in its main composition and character, it is the same. Now it may be expected that food consisting of fresh protoplasmic matter, ready for the growth of a young animal or vegetable, will be the most available kind of food for animals or men.

Such we have in *milk*, in the *seeds* of plants (wheat, rye, corn, rice, etc.), and in *eggs*. There is excellent nourishment, mostly albuminoid, but with a small amount of fat (in the yolk) in eggs. There is, of course, no truth in the popular saying, that "an egg is as good as a pound of meat." *In proportion* to its *weight*, an egg is equally nourishing with meat; that is all.

Eggs are more digestible cooked than raw. This has been proven both within and without the body. *Artificial* digestion can be performed by mixing and warming food in a tight bottle or vessel with an acid solution and *pepsin*, procured from the stomach of a pig or a calf. This being tried with eggs, it has been found that they are soonest digested when cooked *moderately* hard.* When very *long* heated, they become tough and unsuitable. It does not require quite a boiling temperature to cook eggs, as albumen will coagulate at from 140° to 170° Fahr.

It is, of course, of great consequence that eggs shall be *fresh*, when eaten. This precept scarcely needs to be mentioned, because no one is likely to prefer, or even to tolerate, a bad egg. But, as with many other kinds of food, an egg may be *stale*, and so less digestible than when quite fresh, without having begun to approach rottenness. It is not easy to keep eggs long without spoiling. The main thing, for this end, besides avoidance of heat, is the *exclusion of air;* as egg-shells are somewhat porous. A late number of the "Annals of Hygiene" says that "eggs that have been encased in clay and buried in a dry soil for many years, are esteemed great luxuries by the Chinese, and are by no means to be despised. No trace of decomposition can be traced in these ancient eggs, which, by their encasement and burial, are excluded from the attacks of bacteria, and the production of objectionable changes."

The eggs of other birds besides our common poultry, and those of turtles, are often eaten. There is no reason to suppose that the eggs of any oviparous creature are unwholesome.

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* For a number of years the author has eaten at breakfast almost daily one or two *hard*-boiled eggs, with no sign of indigestion ever following their use.

MEATS.

All parts of the Animal Kingdom furnish food for men in some quarters of the earth. *Vertebrates* are represented abundantly; in *mammals* (as the ox and sheep), *birds, reptiles* (*e.g.* the terrapin), and *fishes. Molluscs*, as oysters and clams, are favorites with many. *Articulates* are familiar in the lobster, crab, prawn, and shrimp. *Radiates* do not enter into the common diet of Europe or America; but some tropical dwellers by the sea make the softer kinds a portion of their food. *Protozoa* abound in the water of rivers, lakes, and ponds, but are too small to attract our attention, unless we use a microscope. A Brahmin, whose religion forbids him to put any creature to death, was horrified upon taking a look through a lens at the living things in a drop of water. He was consoled by being told that some one else could destroy them all for him by boiling the water before he used it.

Beef is the strongest kind of meat, the most concentrated albuminoid food. It is, also, when tender, as digestible as any other article of diet. Many dyspeptics eat only beef and bread every day. A larger range, however, would nearly always be better for them. Signs of good quality in beef are these: it should be of a fresh red color, neither pale-pink nor dark-purple; marble-veined lightly with fat; not wet, but firm to the touch; with little odor, none unpleasant; should shrink but little in cooking. If tested with litmus paper, its juice will show acidity by reddening it. Under the microscope, few infusoria are seen in the juice of good fresh meat.

Veal is not nearly so easily digested as beef. Some persons, not usually dyspeptic, have to avoid it altogether. A bad fraud in some city markets is the sale of *too young* veal ("bob" veal). It ought never to be eaten before it is four or five weeks old. The law in New York State forbids its sale under four weeks; but this law is said to be often evaded.

Mutton is very nearly (some analysts say quite) as strong a nitrogenous food as beef, and scarcely less digestible with some persons. Either kind of meat may be tough or tender, and so may give the stomach, as well as the teeth, more labor in disposing of it. Tough meat *does not pay;* don't buy it. Internal work in digestion has to be economized or supported like external work, or the strength goes down.

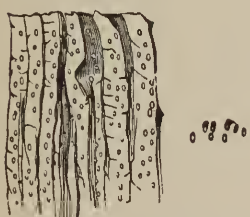
Lamb is more desirable every way than old mutton. It seldom or never comes to our markets too young.

Pork should always be avoided by dyspeptics and by persons of uncertain peptic powers. *All* rules about diet are intended for these

Healthy people can digest almost anything, except bob veal and very ancient knife-resisting mutton, or leathery skirt of beef; anything, in short, that their teeth will chew. Fresh pork, for the hearty, active man or woman, or roast pig, the delight of the humorous essayist Charles Lamb, is good and nourishing; but it must always be *well done.* All hog-meat must be cooked *through* (not only on the surface) to destroy any possible *parasites* which it may contain. Of these, *trichinæ* are the worst, being dangerous to life; but they are certain to be killed, and thus made harmless, by thoroughly cooking the meat. (Figs. 147, 148.) Smoking it without cooking will not make it safe. Freezing it may do so.

Game, that is, meat of wild animals or birds, is generally more agreeable to the palate, and of easier digestion, than that of our domestic animals. *Buffalo* meat (that of the *bison* of the West) is very good; exceedingly like beef. The hump is said to be the most delicate part.

FIG. 147.



TRICHINA IN MUSCLE, NATURAL SIZE.

FIG. 148.

TRICHINA, MAGNIFIED 150 DIAMETERS.

Venison is, when young, delicious and wholesome. Of our smaller animals the *rabbit* and *squirrel* are quite good. *Opossums* are often sold in the Philadelphia markets, but I have not become acquainted with their qualities.

Our large country is naturally well provided with wild food. At a "game dinner," some years ago, all these were served to the guests: oysters, snapper, whitefish, mountain sheep, black bear, buffalo, wild turkey, prongbuck, raccoon, woodchuck, canvas-back duck, black duck, wild goose, prairie chicken, blue-winged teal, green-winged teal, redhead duck, spotted grouse, ruffled grouse, widgeon, opossum, leg of elk, black-tailed deer, jack-snipe, sand-snipe, reed-bird, quail, partridge, plover, fox-squirrel, gray-squirrel, red-squirrel, blackbird, wild pigeon, hare, terrapin.

Birds have weaker, less nitrogenous meat than mammals, but gener-

ally more tender and delicate. Most digestible of domestic birds are the turkey, chicken, and guinea-fowl; less so the duck (though often very good), and least fit for doubtful stomachs, the goose. Pigeons are moderately digestible, but one soon tires of them. Our wild partridges, prairie chickens, and grouse (some of which are often called pheasants, but there are no true pheasants native to this country), and quails, are very good game-birds for the table. So are reed-birds (favorites for invalids and convalescents), woodcock, snipe, and canvas-back ducks. Other wild ducks of American waters are rather apt to be "fishy;" the canvas-back is the best. The wild turkey, a little richer perhaps in flavor than his fellow of the farmyard, is a truly *native American* bird. This cannot be said of the chicken, guinea-fowl, duck, or goose—all natives of the old world. The turkey is perhaps our most valuable original contribution to the diet of mankind, unless we except the potato and maize (Indian corn).

Other American gifts to the world's diet may be here mentioned—the tomato, cocoa (cacao, used as a beverage, not the cocoanut), pineapple, cranberry, watermelon, cayenne pepper for seasoning, and vanilla for flavor. Tobacco is native American, but is not a food; and cinchona bark, from which quinine is obtained, is worth more to the world medicinally than any other drug, except opium and iron.

Of **reptiles**, turtles are the only ones eaten in civilized countries, besides the legs of frogs, whose use at table has given the Frenchman in England the name of Johnny Crapaud. The terrapin is the American favorite; in England, the green turtle. Our snappers also make very good soup. Lizards are eaten in parts of South America.

Fish, of some kinds, are consumed in almost all parts of the world. Thousands of people depend upon fishing for their living. There is still less nitrogenous material in fish than in birds' meat; some, as the salmon, have a good deal of fat. A larger proportion of the phosphates (salts containing phosphorus) is present in their substance than in land animals. Some persons imagine that fish are therefore especially a brain-making diet. But there is enough of the phosphates in ordinary meat and bread for any one's brains, if he can appropriate and assimilate them well.

Not all fish are wholesome; a few kinds are said to be poisonous. Dr. Letheby mentions one sort, eating which has produced death within an hour. The bladder-fish or toad-fish of the Cape of Good Hope has the reputation of being unsafe to eat. In some books the following are called uneatable: old wife, yellow-billed sprat, coryphœna, blue parrot-fish, conger eel, smooth bottle-fish, and barracuda. I have met with the assertion that the fish of the river Nile are unwholesome. But the

natives of Egypt catch and eat them in large numbers; and in the Book of Exodus the Israelites are said to have sadly missed, in the wilderness, the "fish of Egypt." Certain fishes are not good at the *spawning* time of year. This is the case with the shad and salmon, which should always be taken during their time of going *up* the streams which they frequent near breeding time. *Idiosyncrasies*, however, before spoken of in regard to fruits, are also now and then met with about fish. Some people have nettle-rash, or other symptoms of indigestion, to follow eating particular varieties of fish.

But, generally speaking, fresh fish, nicely cooked, are wholesome and nourishing. Whoever has caught a mess of brook trout in a crystal stream, cold as snow, among the White Mountains of New Hampshire, or near the head-waters of the Juniata, in Pennsylvania, has had as good a supper as Isaak Walton ever ate or dreamed of. Delaware shad, too, are delicious. Salmon were left out of Banting's diet as too rich; but they, and the Englishman's white-bait, and halibut, black fish, sheep's-head, rock-fish, cat-fish, fresh mackerel, fresh cod, and twenty other kinds, make an excellent variety wherever any of them can be had for the table.

One who has only eaten "cod-fish balls" inland, or salt mackerel some months old, can hardly imagine how good such fishes are when just out of the water. If you ever pass the banks of Newfoundland, try to get your captain to buy some cod of a fisherman there, and have it cooked for you. You will not then recognize its ordinary flavor or odor at all. This illustrates a fact, equally true of delicate fruits; the nearer their natural source, the less the time since they were gathered, the finer their flavor. Few things of exquisite taste (except wines, and not *all* of *them*) lose nothing by keeping. Some fruits (although with pears it is not so) part with their best taste in a few hours; many, in a day or two. Winter apples, nevertheless, are not to be despised. Neither are sardines and anchovies, put up along the Mediterranean in oil for exportation. It should be remembered, however, that *a diet of salt fish* for months together, with nothing else, will not keep any one in good health. Whole crews of men on long voyages have perished, before and even since Captain Cook's time, from trying to live entirely on salt food.

Of **articulates**, lobsters, crabs, prawns, and shrimps have been already mentioned. Lobsters, at least, when *fresh*, are not unwholesome for most people. Served as part of a great feast of superfluities at a late supper or an *anaconda-like* dinner, what food would not sometimes disagree? Moreover, everything taken out of the water spoils soon after it dies. The place to enjoy lobsters, crabs, and shrimps safely is

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at the sea-shore. *Insects* are eaten in some parts of the world; of them again presently.

Molluscs, as *oysters* and *clams*, are nowhere more appreciated than in America. Our oysters are probably the *best* in the world; although in tropical waters they grow a great deal larger. Those caught on the British shores are far inferior in taste to ours. Clams are tougher, and much less digestible; their soup can be enjoyed, however, without risking the hard clam itself.

Oysters are really an important staple in our Eastern States. Many a valetudinarian almost lives on them, who has no relish for steaks, roasts, or "hot joints," and little even for poultry. Convalescents can begin with good sound oysters before they dare venture upon more solid food. One of their virtues is, that they can be cooked in so many ways. Raw, they are digestible by the hungry man almost always. Roasted in the shell, they are manageable by every stomach that has any gastric juice in it; no solid is more digestible. Panned, steamed, stewed, broiled—did ever Apicius or any Roman emperor taste more precious morsels, brought to him a thousand miles? *Fried* oysters must be, with the dyspeptic, placed on the *index expurgatorius;* quite forbidden, under penalty of bad dreams or worse effects.*

* Within the last two or three years, from some wrong notions about keeping and "fattening" them, the supply of oysters in Philadelphia has deteriorated. The nearer they are to their original, natural oceanic state, the better they are, and the more wholesome.

CURIOSITIES OF DIET.

In Austria, even in Vienna, it is said that ants are eaten, sometimes served upon the table alive; and candied beetles also. Cockchafers are food for some people in Italy. John the Baptist ate locusts and wild honey. Possibly the fruit of a locust tree (karob) is here meant; but, more likely, the insects, which are a good deal like our Rocky Mountain grasshoppers. Arabs, Moors, and Hottentots all eat locusts freely. Humboldt saw South American Indians eat centipedes. Lalande, the astronomer, was very fond of spiders. Charles Darwin called a certain kind of caterpillar delicious. In Ceylon bees are commonly eaten. In Africa monkeys are often eaten; Sir Samuel Baker there, and Hœckel, the naturalist, in Ceylon, liked them much, after getting over the idea of their resemblance to men. Cannibals still exist in some parts of Africa and Australasia, and, within a few years, this has been asserted of an Indian tribe, almost extinct, in South America. Lizards are often eaten by some natives of that continent.

The Chinese eat earthworms, rats, and birds'-nest soup. Mention has been made on a previous page of their fondness for eggs which have been buried for many years underground. According to a painting of a Roman dinner, found under the ashes of Pompeii, ancient epicures in Italy ate snails and rats. Colonel Fremont, in his Rocky Mountain explorations many years ago, and Dr. Hayden near the same regions since, have shared dog-meat with American Indians. Bongos, on the Upper Nile, love their cats better than elderly maidens do: they eat them. During the siege of Paris by the Prussians, in 1870, not only horse-meat, there a common article before, but all the wild animals in the *Jardin des Plantes* were consumed by hungry Frenchmen. Their skill in cooking would make anything agreeable.

No doubt, unused treasures of food for our use abound everywhere. Why should not Professor Riley, the entomologist, be right, after trying them himself, in advising that the Western grasshoppers be eaten, in retaliation for their sometimes devouring the crops of Kansas and Nebraska? Men will need, some day, to give up their fancies and prejudices, and be more willing partakers of the varied bounty of nature.

THEORY OF COOKING.

Man is the only animal that cooks his food. Why does he do it? He *could* live, in the warmer climates at least, on roots and fruits, especially with the addition of cow's, goat's, or other milk. But our *range* of diet is greatly enlarged by cooking many things not eatable raw; and appetite is favored also by greater variety of taste being given to our prepared dishes.

Cooking is an artificial *beginning* of *digestion.* It commonly makes things soft and tender; that is, breaks up their resisting fibres, and makes them more easily soluble in the gastric juice and other digestive fluids. Take raw *string beans,* for example, and think of (don't try) digesting them. Dr. Beaumont's soldier patient would probably have given him trouble under that experiment. But, with four hours' boiling, they become tender and safe for most people.

Boiling (that is, using a *high* heat with water) and *stewing* (exposing long in water to a heat *less* than boiling) are the most effectual ways of producing tenderness in articles of food. Roasting and baking have somewhat of this kind of influence also, except when continued so long, or at so high a temperature, as to dry up, and thus harden things. By dry heat, also, a different effect is produced on the flavor of what is so cooked. *Ozmazome* is a name for the brown material on and near the outside of roasted meat, which is very pleasant to many tastes.

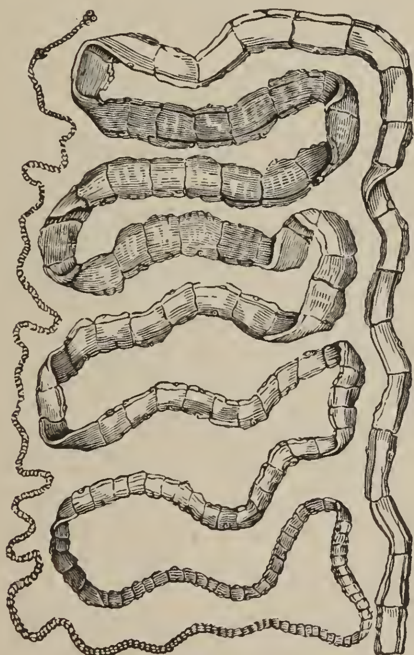
Roasting and *baking* are not the same in their effects on meat. Properly done, roasting is cooking in front of the fire, the meat being exposed to the air. Baking is cooking in a closed oven. The difference is, that some vaporous matters, produced by heat, are driven off in the one case and kept in the other. Roasting is much the best and most agreeable in effect of the two; but it is more troublesome, and not so often carried out, even when ordered.

An interesting point is as to the respective effects of *quick* and *slow* cooking, either roasting or boiling. When a piece of meat is put at once near a hot fire, or into boiling water, the albuminoids in it are *coagulated* at the surface by the heat, sealing it up against the escape of its juices. All the strength of the meat is thus kept in it. But when it is put near or on a slow fire, or at some distance from a hotter one, or when it is placed in *cold* water which is *slowly heated,* no such early coagulation takes place; the heat acts by degrees on the whole of the meat, and its juice oozes out. If *roasted* in this way, there is gravy: and if slowly *boiled,* the *soup* contains a great deal of strength; the *meat* which is then left retains very little.

When, then, we *wish* to keep the strength of the meat in it, we must cook it *quickly,* at least at the start. If we desire, instead, to get a strong *broth,* we must put it into cold or tepid water, and first stew and then boil it slowly for a considerable time.

Frying makes many things, especially fish and potatoes, pleasant to the taste, and, if it be skilfully done, innocent for people of good digestion. Good fresh butter is the *nicest* material for this use. Dyspeptics have to avoid fried oysters and other fries, as a rule; especially when too much lard is used, and when it is *overheated.* Grease at a high heat,

Fig. 149.



TAPEWORM (TÆNIA SOLIUM).

long continued, gives off *acrolein,* an unpleasant and unwholesome product, known to us by its smell in the wick of a candle just blown out.

Broiling is more generally an acceptable mode of cooking, in view of digestion, than frying; but it also requires skill and care to do it well.

With meats, the most necessary thing is *tenderness.* Those a little tough may be made eatable by *hammering* before cooking. *Raw* meat is digestible, if it be tender and fresh, and if the eater likes it. *Freezing* meat does for it somewhat of the same service as cooking, by bursting the cells and breaking up the fibres, so as to tender it. In the Arctic

regions frozen raw meat has proved a better preventive of scurvy than cooked meat. Moreover, thorough freezing will kill *trichinæ* (thread-worms) when present in pork.

Scrapings of raw beef are sometimes given to sickly infants as strong food, and so is the *expressed juice* of meat. There is one objection to this: once in a while the eggs of *tapeworms* are in the meat, and may develop in the child's intestines. This has been a few times known to happen. (Fig. 149.) For this reason, the "raw beef and brandy" feeding of consumptive patients is not so commendable as the use of beef essence or beef tea; in the preparation of which the heat is sure to kill all parasites.

SOUPS.

Broths will do very well, to please taste and make a variety, if they are not too *thin* and *weak*. When made sufficiently nourishing, the liquid form gives the least labor to the digestive organs, and is the best for very feeble persons. This is especially true of those ill with serious diseases; for example, typhoid fever. A meal of solid food cannot be digested by such an one; it would remain in the stomach too long, and might cause dangerous irritation. Therefore, we give the patient *milk*, or *beef tea*, or *beef essence*, in *tablespoonful* portions, every two or three hours (sometimes even every hour), day and night. So given, the food sustains the patient's strength, without taxing the stomach by an effort of digestion. For a person in *health* a *moderate* distension of the stomach by solid food is natural and suitable.

The *modes of preparation* of beef essence and beef tea will be set forth in another part of this book.

Blood might be supposed from its nature to be an available liquid food. In the Mosaic law it was forbidden; but this may have had a reason in the rapid changes which animal fluids undergo in the warm climate of Palestine. Greenlanders consume a good deal of seal's blood; and blood-puddings are occasionally made in this country. Velpeau, a distinguished French surgeon, advised consumptive patients to drink fresh blood, warm from the slaughtered animal. In New York, not long since, it was stated that as many as two hundred people, men, women, and children, resort to it daily. A slaughter-house proprietor said, "they always imbibe *beasts'* blood, never the blood of sheep. Some of them wince a bit at first; but, when you close your eyes, blood warm from the beast's neck has just the same taste as warm milk from the cow."

ADULTERATION OF FOOD.

Volumes have been written upon this subject; but the most important facts can be briefly stated. Much the larger number of adulterations are those which *cheat the pocket* without endangering the health—fraudulent but not poisonous substitutions and mixtures. Still, while not involving peril to life, they often cause trouble in digestion, and lessen the nourishing power of foods; and this last may be of great consequence to feeble persons, and especially to delicate infants. Food adulteration is therefore a crime, which ought to be punished severely.

Alum in *bread* is a common addition. One part to a thousand of flour seems to be harmless; much more than that is astringent and harsh to the stomach. Chemists can readily detect it by a test.

Chrome yellow in buns killed several persons in Philadelphia in 1888.

Marble in *pulverized sugar* has been mentioned already. It is detected by the marble *not being dissolved* when the sugar is put into clear water. This fraud, as well as that of sanding brown sugar, is probably less common than formerly.

Vinegar is often hurt by the addition of *sulphuric acid* (oil of vitriol). This gives it an intensely sharp taste, and, in large amount, an irritating quality. It is tested by chloride of barium (making a cloudy precipitate).

Olive oil (sweet oil) is subject to dishonest mixture with oil of cotton-seed and other cheap oils.

Spices are much adulterated, when sold after being ground, with inert materials, not injurious but comparatively worthless; potato meal, for example. Red pepper sometimes has mixed with it logwood or mahogany dust, brick dust, or red lead. The last mentioned is poisonous, but is seldom present in large amount. It can be detected by throwing a little of the cayenne pepper into a tumblerful of water. The heavy red lead will sink rapidly, being a mineral substance; while the pepper will go down slowly to the bottom.

Milk is proverbially weakened with water, as well as robbed of its cream. More will be said of this some pages later in the book.

Cream of tartar, which is not a food, but is often used with soda in making bread, is frequently adulterated with gypsum and other useless and cumbersome mineral substances.

Arrow-root is apt to have mixed with it the much cheaper *potato-starch*. The certain mode of detection of this is the examination of the minute corpuscles with the microscope. The difference amongst these has been described already, in speaking of *starch* and its varieties.

Baking-powders are not uncommonly weakened with starch; and *candies,* with both starch and plaster of Paris.

FIG. 150.

PURE COFFEE, UNDER THE MICROSCOPE.

FIG. 151.

COFFEE WITH CHICORY, MAGNIFIED.

Coffee, when ground, is often adulterated with *chicory-root, wheat flour,* etc. This also is only a fraud, not injurious to health.

Tea has a great variety of leaves and flowers, not of the true tea-plant, mixed with it, even in China. Indigo and Prussian-blue are sometimes used to heighten its color, but never in poisonous quantities, as neither of these coloring materials has dangerous effects.

Colored confectionery is liable to be made actually *poisonous* by the use of metallic colors containing copper, lead, or sometimes even arsenic. Protection against this danger, as well as that of adulterated *wines and liquors*, is easily secured by *avoiding those articles entirely;* this being the safest course even when they are at their best.

Comparative Digestibility of Foods.

Easily Digested.	*Moderately Digestible.*	*Hard to Digest.*
Beef,	Mutton,	Veal,
Lamb,	Fresh Pork,	Ham,
Chicken,	Duck,	Goose,
Turkey,	Salmon,	Salt Fish,
Milk,	Cheese,	Preserves,
Boiled Eggs,	Raw Eggs,	Clams,
Sweetbread,	Liver,	Kidneys,
Trout,	Terrapins,	Sardines,
Mushrooms,	Lobster,	Calf's Brains,
Roast Oysters,	Stewed Oysters,	Fried Oysters,
Stale Bread,	Hot Bread,	Batter Cakes,
Good Butter,	Melted Butter,	Bad Butter,
Rice,	Potatoes,	Pastry,
Peas,	Beans,	Turnips,
Cauliflower,	Cabbage,	Cucumbers,
Peaches,	Apples,	Cherries,
Raspberries,	Strawberries,	Pears,
Oranges.	Currants.	Pineapples.

DISEASED MEATS.

We must suppose the flesh of an animal which has died from disease to be always unwholesome. It has happened, however, that much less harm has come from it, in many cases, than was to be expected. Animals dying in Germany of the *rinderpest* (cattle plague) have, in times of scarcity, been eaten by the poor in large numbers, at least without fatal effects.

Acute, rapid disorders, act most upon the *blood*, and cause but little change in the solid substances of the animal. Slow *chronic*, wasting

disease is more likely to produce alteration of the flesh, making it unsuitable for food. On the whole, whatever number of escapes from injury may have been reported, it is the dictate of reason never knowingly to eat the meat of an animal which either died from disease or was unhealthy before it was killed. It is, of course, also unsuitable to eat meat which has begun to spoil; although here, too, the mischief done is less than might be looked for, and some epicures imitate the vultures in preferring to have their game "high"; that is, a little tainted. Hard driving of cattle through long distances, especially in hot weather, makes their meat unwholesome.

EXCESS OF FOOD.

Most people, of the well-to-do classes at least, eat too much. When that is done, a person of strong digestion is apt to become *plethoric;* that is, to have an over-abundance of blood, containing more red corpuscles than are needful or beneficial. Such an one is more liable than others to *inflammatory* diseases and to *hemorrhages;* such as bleeding from the nose, spitting blood, or, in an older person, apoplexy (blood thrown out within the head, causing death by pressure upon or within the brain).

More commonly, the excess of food, if not very great, goes out as refuse through the bowels. Often, however, *indigestion* is caused by it, with flatulence, sick stomach, and headache, frequently called, without good reason, "biliousness." *Habitual* indigestion is *dyspepsia.* Degrees of this are various, and very many people keep themselves uncomfortable half the time by stuffing themselves with all sorts of unwholesome things, superfluities, the "luxuries of the table." The common proverb is only not as strong as it should be—enough is *better* than a feast.

Gout is produced, in some constitutions, by eating too large a proportion of *animal* food, with too little exercise; but much more certainly, by adding also wine or malt liquor to the regimen. An excess of *fat* in the diet, besides indigestion, seems to promote disorder of the liver, although this effect is not so frequent as is often supposed.

Worms (or their eggs) are taken into the stomach either in food or in water. But they are a great deal more likely to remain, grow, and increase in number when the stomach and bowels are kept loaded with undigested or half-digested food.

STARVATION.

Some time back in this volume, mention was made of the time that various animals and men can live without food. Man can seldom survive more than ten days or two weeks of actual starvation. During a famine some years ago, in France, a French physician, Chossat, found it possible to watch and note down the symptoms of those who were starving to death. He observed that they, and animals experimented upon, *lost weight*, day by day, death occurring when two-fifths of the original weight of the body were lost. The *heat* of the body, also, was lowered; most of all in the last days of life. Hunger, which was a cause of distress for some days, then disappeared, and instead of it came pain, with a sense of sinking, in the region of the stomach. Sleeplessness existed, with extreme weakness; towards the last, delirium (or convulsions) and a fetid odor from the skin and breath; often, also, diarrhœa.

The addition of cold, wet, general discomfort and anxiety, to privation of food, must always hasten its fatal result. The mental faculties in some instances give way. Thus, perhaps, we may in part account for the terrible things which sometimes happen amongst those exposed at sea after shipwreck, or in the Arctic regions. There is little reason to doubt that some of Lieutenant Greely's party ate the flesh from the bodies of their dead comrades; and, in 1884, the captain of the *Mignonette* was convicted of murder, in England, for having killed a sick boy to save the lives of himself and his crew, when without food out at sea.

A *deficiency* of food, short of starvation, causes *anæmia*, the opposite of plethora, in which the blood is thin and watery, the red corpuscles being too few, and containing less than their natural amount of iron. Neuralgic pains, various other nervous symptoms, and diseases of debility (among them scrofula and pulmonary consumption) are promoted by this state of the body.

POISONOUS FOOD.

Milk sickness is a malady of which, twenty-five or thirty years ago, accounts came from some of the Western States, as far east as Ohio and West Virginia. One old gentleman's diary, in the last-named State, says that the disease was caused by drinking the milk of cows pastured in certain meadows in the night, or at sunrise or sunset; those feeding only during the hours of sunshine not being affected. With the increase of settlement and experience in pasturing cattle, this disorder seems to have died out.

Sausage poisoning now and then occurs, with even fatal results. Chemists have in a few instances found a peculiar deleterious principle in the sausages, but not always. By reasonable care in the selection and preparation of sausage-meat, such accidents should always be avoidable. *Uncooked* sausages should never be eaten for fear of *trichinæ*, if of nothing else.

Canned salmon made a family ill at Yonkers, New York, in 1875. It is charged that *venetian-red* and *red lead* are put in to color salmon for canning by some dealers. This is very wrong. *Canned fruits* and *vegetables* are sometimes made unwholesome by scraps of the solder, containing lead, being partly dissolved, or even swallowed whole.

Iron ware lined with *enamel containing lead* is unsafe for cooking. One infant in New York was fatally poisoned by having its milk boiled in such a vessel. *Chrome yellow* poisoning has been mentioned, p. 279.

Some persons have entertained the opinion that *pure tin* is not a safe material for canning vegetables, fruits, or meats. But careful chemical investigation makes it appear that if the tin is *clear of lead and arsenic* (as it ought always to be for such a use), it is not capable of doing harm in any amount that could thus be dissolved and taken into the stomach. As, however, some tin does contain lead, *acid* fruits, as *tomatoes* (which contain acid), may become unsafe when *kept* for more than a year in cans, and also when exposed to the air for some days *after the cans have been opened.* Dr. Johnson, of Brooklyn, was led, by several severe cases (occurring in one family) of poisoning from tomatoes, to examine the cans in which the vegetable was put up. He found the sides and bottom of the can were fastened by the usual resin amalgam, and were perfectly bright and sound; but a trained tinsmith pointed out that the cap of the can was fastened on with an amalgam made of muriate of zinc. The tin was corroded around the cap on the inside of the can. The mechanic explained that pieces of zinc are placed in muriatic acid and dissolved, and this saturated solution of zinc had been painted with

a brush into the grooves of the head of the can. "He said this was a very favorite amalgam with roofers, on account of the quickness with which it could be applied; but that good architects and builders would not allow of its use, because it rotted the tin." Some of it had undoubtedly got into the can's contents. This explained the cases of illness. In the State of Maryland, where legislative attention has been called to canned goods, there is a law prohibiting the use of this muriate of zinc flux. It is safe to conclude that, wherever the inside of a can-lid shows that the tin has come off in patches, something has dissolved it, and it is mixed with the can's contents. Tin-poisoning, perhaps slow, but accumulating in the system, will be the result from eating food from such cans. Pieces of solder are sometimes loose in the contents of cans.

A perfect can, to quote this authority, should show the same line of resin around the caps that it has on the sides. It should only show one "solder hole" on the top. If there are two, that means that the cans have at one time fermented, and had become "swells," that is, the gases and ferment from inside have pushed out the head. Such cans are sometimes bought up, another hole punched in them to let the gases escape, the can then is reheated and soldered up again. A sound can should have its head bulged *in* rather than out, and must feel solid to pressure on the bottom.

On the other hand, a commissary officer of the United States army, in 1884, published the statement, that, in the distribution of canned vegetables during many years to thousands of soldiers, not a single instance of poisoning thereby had occurred. He is sure, therefore, that no such thing need ever happen; it being made possible only by some avoidable fault in the article used, which ought to be capable of detection when the can is opened, if not before.

Pickles made or kept in *copper vessels* are rendered poisonous by the *acetate of copper* formed and dissolved by the vinegar. Such vessels should never be used for pickling. Neither should copper be employed to *boil* or strongly heat anything that is to be eaten. Under heat, the action of liquids on copper is greatly increased. The presence of carbonic acid also promotes the solution of copper, as is shown by the injurious effect of using copper reservoirs to hold "mineral water" or soda-water for fountains. The enamel lining of such reservoirs wears off in course of time, leaving the copper exposed to the carbonic-acid water. If such fountains are allowed at all, the mineral water ought to be frequently *tested for copper*, to prevent mischief being done. Dr. Waller, of New York, reported to the Board of Health that he found, in some *cucumbers* offered for sale in that city, thirty-seven grains of copper to the pound, added to give a bright green color to them. This

is very bad. The conditions determining the action of ordinary drinking waters on lead have been treated of already in this book. It may be here repeated that water for cooking should never, with those who have boilers heated by kitchen ranges, be drawn from the *hot water spigot.* Cooks are often tempted to get it thence to save themselves the trouble of heating water on the fire. But it is unwholesome, because *hot* water may act on the lead pipes when the same water *cold* will not. Some boilers also are made or lined with copper; and even iron, under a high heat, may give enough rusty material to water to make it not good to drink or to use in cooking.

Other ways of introducing poisonous substances into our bodies occasionally exist, but may be avoided by reasonable carefulness. Examples are, filling up hollows of millstones with bits of lead; and baking bread over a fire made of old bits of wood covered with paint, vapors from which get into the bread. Such things, however, are very rare.

While this book is being printed, I have met with an example in my own house, showing how a *filter*, intended to purify water, may, without care, make it poisonous. A very good Jewett's water-filter, through which all my family drinking water has passed for a year or more, was found to give out water containing small sand-like particles, of a green color. On examination, these were ascertained to consist of *copper-rust*, carbonate of copper, from the inside of the brass *spigot* of the filter. This shows the thorough *cleansing* of such spigots to be important.

In 1886, Professor Vaughan, of Michigan, discovered a poisonous substance, *tyrotoxicon*, in very badly-spoiled cheese, rancid milk, and some ice-cream which made those who ate it sick. The greatest care should always be taken to have milk for use *fresh*; especially for young children.

The Philadelphia Board of Health lately declared the use of the following coloring matters to be not allowable in food or drink: "King's yellow, chrome yellow, chrome zinc, Mosaic gold, minium, purple red, colcothar, crocus, chrome green, Paris green, emerald green, Brunswick green, ultramarine, Antwerp blue, Vandyke brown, puce, chrome orange, Turner's yellow, Turpeth mineral, Naples yellow, orpiment, red lead, iodine scarlet, rouge, Rimner's green, Scheele's green, Schweinfurth green, mountain blue, soluble blue, sienna, kermes mineral, cadmium yellow, citron yellow, yellow ochre, Paris yellow, vermilion, realgar, red ochre, mountain green, verdigris, mineral green, Prussian blue, blue vitriol, umber, and all colors not herein mentioned, containing or liable to contain appreciable quantities of arsenic, antimony, mercury, lead, copper, tin, zinc, barium, cobalt, nickel, cadmium or bismuth."

CONDIMENTS.

Seasoning is the common term applied to the use of salt, pepper, mustard, and spices, as additions to our food. Of these, salt has a service of its own, as a necessary ingredient of our blood, and otherwise, as mentioned on previous pages. The other condiments are *stimulants* to the action of the stomach, besides being agreeable, in greater or less degree, to the taste, and favoring appetite.

All **spices** are natives of warm climates. Under the relaxing influence of such regions, stomach and bowel affections are common, and the

FIG. 152.

PIPER NIGRUM.

FIGS. 153, 154.

MUSTARD PLANT.

internal warmth caused by aromatics is often beneficial. Yet, in all places, they need to be taken with moderation.

Over-stimulation, like the over-driving of animals, is wasteful of energy, and, in the end, destructive. This is true even of the mild excitement of the palate and stomach by pepper, mustard, or other seasoning.

Children do not generally like highly-seasoned food. They do not need it, and are better without it. Its right place is in the diet of those

who are enfeebled by age or disease. If *reserved* for such occasions of use, its full advantage will then be gained. But those who, from early life, become accustomed to it, cannot be helped much by it when their powers of digestion fail, and they have need of it. When, as an indulgence, people will take things difficult of digestion, or mere superfluities, seasoning undoubtedly helps the stomach at the time to dispose of the excess.

Pepper is of two kinds: black and red pepper. These come from

FIG. 155.

CINNAMON.

different plants; one is a native of the Old world, and the other of the New.

The *black* pepper is the fruit of a vine (*piper nigrum*), native to the East, but much cultivated also in the West Indies. Red or *Cayenne* pepper (*capsicum*) is indigenous in South America and the West Indies. It is a kind of pod, familiar as raised often in Northern gardens. Red pepper is a much *stronger* stimulant than black, and needs to be used in much smaller quantity. For well persons the black pepper

should, as a rule, be preferred, for the same reason. In an exhausted condition of the stomach or general system, cayenne pepper may be very useful; for instance, in seasoning the food of a patient having *delirium tremens,* or one who is breaking off the habit of drinking liquor. Most persons who are weak enough to need beef-tea or beef-essence as concentrated food, will profit by having it moderately seasoned with red pepper, as this makes it more likely to be easily appropriated by the stomach.

Mustard is the seed either of the *white* or the *black* mustard-plant (sinapis alba and sinapis nigra), both natives of the Old world.

Fig. 156.

VANILLA PLANT.

White mustard is generally preferred for table use, as more delicate. It is an interesting fact, that while a *little* mustard, put in as seasoning with food, is stimulating and comfortable to the stomach, a *large* dose of it is one of the surest things to cause vomiting. The same is true of *salt,* and of some vegetable *bitters*—as camomile, hoarhound, and boneset. In case of poison having been swallowed, the handiest emetic to rid the sufferer of it will mostly be a *tablespoonful of salt* or a *teaspoonful of mustard,* in a teacupful of *warm* (not hot) water.

Allspice (pimento) comes from a plant of the same genus as black pepper. **Mace** is the inner covering of the **nutmeg** fruit. Other well

known and pleasant spices are **cloves**, unexpanded flower-buds of the *caryophyllus* plant; **cinnamon**, the bark of an East Indian tree; **ginger**, the root of a plant (*zingiber*), originally Eastern, but now brought to North America chiefly from Jamaica; **caraway**, **cardamom**, and other seeds, etc. **Vanilla** is a somewhat aromatic plant of American origin, the taste of whose extract is agreeable in ice-cream and other luxuries. **Orange-peel** and **lemon-peel** both contain aromatic oils, making them pleasant flavoring materials. All the spices depend for their characteristic properties on the presence of peculiar volatile oils (that is, oils which are driven off by heat). Some of these oils are distilled, and used variously in medicinal preparations, especially those of ginger, cinnamon, and cloves.

DRINK.

Water, which, after air to breathe, is the first necessity of life, has been sufficiently treated of in this book under the heading, **Our Homes** (*Water Supply*). Other beverages now require attention.

MILK.

Where shall we look for a perfect food, if not in that supplied by nature for the young of the highest class of animals, including Man? Examination of its qualities, as well as abundant experience, proves that it fully meets this expectation.

Cow's, goat's, ewe's, mare's, ass's, and buffalo's milks are used by people in different parts of the world. They all contain the same nourishing substances in different proportions. Tartars use mare's milk; Egyptians, that of the buffalo; elsewhere, that of the cow and goat are much the most employed.

	Cow's.	Ass's.	Goat's.	Ewe's.	Woman's.*
Casein and Albumen . .	4.48	1.82	4.02	4.50	1.52
Butter	3.13	0.11	3.32	4.20	3.55
Sugar of Milk	4.77	6.08	5.28	5.00	6.50
Salts	0.60	0.34	0.58	0.68	0.45
Water	87.02	91.65	86.80	85.62	87.98
Total	100.00	100.00	100.00	100.00	100.00
Solids	12.98	8.35	13.20	14.38	12.02

As above shown, these contained substances are **casein** and **albumen** (nitrogenous); **butter** (oleaginous); **sugar** (amylaceous); and **salts**; all diluted with water. A very small amount of a peculiar animal principle gives a difference of odor and taste to each kind of milk. Ewe's milk is somewhat the strongest in nutritious solids; next goat's; then cow's; lastly, human milk and that of the ass. These last are the two most alike. But they are all available for food, with proper management and under different circumstances.

Looked at it with a microscope, milk is seen to consist (like blood) of a watery fluid, in which float a great many cells, or **corpuscles**.

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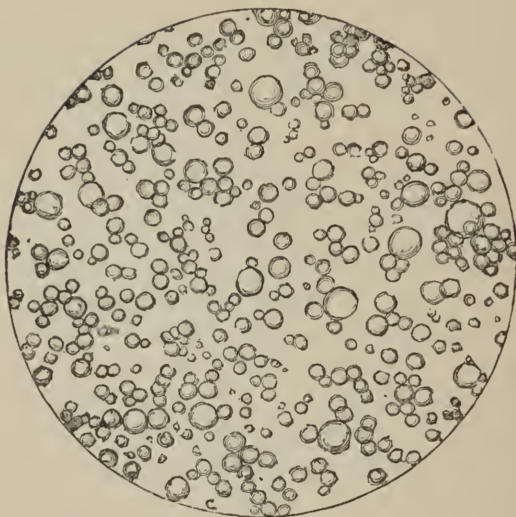
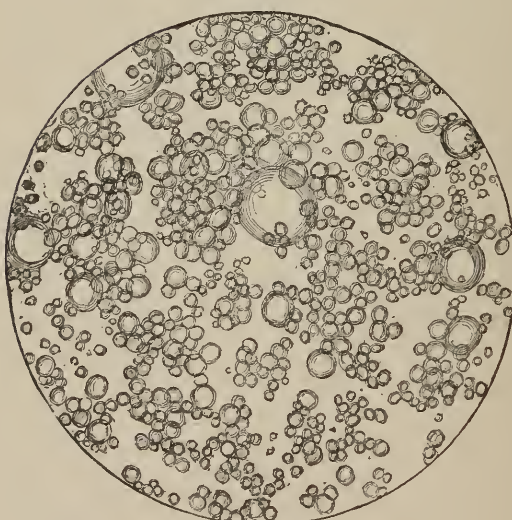
* Another analysis (Doyère) of human milk is the following: Water, 87.38; Butter, 3.80; Casein, 0.34; Albumen, 1.30; Sugar, 7.00; Salts, 0.18; Total, 100 parts. In recent discussions upon the chemistry of milk, some writers make very little reference to *casein;* applying the term albumen, or albuminous material, to all the nitrogenous portion of milk.

Fig. 157.



MILK, UNDER THE MICROSCOPE.

Fig. 158.



CREAM, MAGNIFIED.

Each of these little round bodies is composed mostly of butter, surrounded by a delicate coat of albumen (or casein), which holds it together. When milk or cream is churned, or otherwise shaken or beaten, these corpuscles are broken, and the butter is separated. This is the simple theory of the making, that is, getting out, of butter.

All the world knows that, when milk stands awhile, the cream rises to the top. This takes place gradually; all of it not floating up until after several hours; hardly less than ten or twelve hours. The best *temperature* for raising cream is between 55° and 59° Fahr.

In a warm place milk soon begins to *spoil.* We perceive this when it *sours;* lactic acid then being formed in it. A very small quantity of this acid is often present in cow's milk even when fresh. I have found country milk, only half an hour from the cow, to slightly redden litmus paper—the test for acidity. Some authors mistakenly advise using litmus paper as a sufficient test for the sweetness and freshness of milk, asserting that, if fresh and sweet, it is always alkaline; that is, will leave the blue color of litmus paper unchanged, but will turn the yellow of turmeric brown. But Professor Parkes, in England, and Drs. Meigs and Ashurst, as well as myself, in this country, have found that *good milk right from the cow* will *generally* redden litmus paper; not much while fresh, but enough to prove that it is not alkaline. Only when litmus paper is *strongly* reddened does it show an *excess* of acid (souring) in milk.

But the first "spoiling" change really occurs in the *casein.* This (which, when separated, becomes *cheese*) begins to decompose, and its breaking up starts that of the sugar of milk (lactin), from which lactic acid is produced by a chemical change. Then the remaining casein is *curdled* by the action of the acid upon it. Now it is what is called "sour milk."

Further spoiling goes on, with *rancidity,* from the formation of *butyric* acid from the butter, and *putrefaction* (if a long while kept) of the albumen and casein. A microscope will then show in it some of those tiny organisms, *bacteria* or *vibriones,* which always abound in decaying animal and vegetable materials exposed, more or less, to the air.

Very certainly milk is only good and wholesome when *fresh.* An ice-cold temperature will delay the changes above mentioned, which constitute spoiling; but in warm weather and in a warm place this goes on rapidly. A sick baby may be made seriously worse in summer by taking milk only three or four hours old, before it has any sour taste at all. If milk *must* be kept in hot weather without ice, it should be *boiled* as soon as possible; then it will keep wholesome much longer.

Other causes of injury to milk exist, besides keeping it in a too warm place. As they are important, we may name them all together:

1. *Staleness* (just referred to).

2. *Mixing* fresh with stale milk.

3. Using *uncleaned cans.* They must be *scalded,* a little soda being added (at least every day or two) to the water; then *aired,* and, if possible, *sunned,* to make them *perfectly* clean.

4. Exposure of the milk to *bad air.* Nothing absorbs foulness like milk. (Butter does so almost as readily.) A dairy should never communicate with a house, and milk should never be kept standing in rooms in which people live.

5. Milking *unhealthy cows.*

6. *Stall-feeding* of cows all through the year, never giving them any natural pasture. True, with good stalls and plenty of good food, they may become used to this artificial living, and their milk may be good; but *not the best.* Such a mode of life is too far from nature.

7. *Unwholesome food* for cows. About the worst of this is the *swill-food* from distilleries; in and near large cities such is not rarely given to cattle. This makes wretched milk, not fit ever to be used.

8. Removal of the *cream.* Skim-milk contains the *tissue-making* (nitrogenous) portion, and is therefore nourishing; but it lacks the specially *force-producing* oleaginous part, which is in the cream. Some physicians of late years have prescribed a diet of skim-milk in treatment of certain diseases. I doubt its ever being so desirable an article of food for sick or well as *whole milk,* cream and all.

9. *Addition of water.* This is the "original sin" of dairies. It is so easily done, and not easily detected and proved; and it is (in lucre) so profitable! Prof. Chandler, of New York, publicly asserted, some years ago, that one quart in every four or five of the milk sold in that city was added water. My quondam milkman (not now continued in that function) once, when accused of such an addition, coolly said that no *bad* water was ever put in his milk, and added to this an invitation to go over and see his splendid hydraulic ram! The difference between bad and good water added to milk, or used to wash milk-pans, is, it is true, very important. There is no doubt that typhoid fever and other diseases have been sometimes traced in numbers of cases to contamination of milk *at the dairy* by impure water. Even allowing cows to *drink* foul water appears at times to vitiate their milk.

10. *Other* possible additions. Chalk, magnesia, soda, salt, starch, and brains of sheep are said to be put into thin, poor milk to whiten it and neutralize its acidity, as well as to increase its density. The least used, no doubt, of these adulterations is sheep's brains. Chalk, starch, salt, and soda, perhaps magnesia, are probably often thus employed.

How, then, are we to *know* good milk? First, by its *appearance*, *taste*, and *smell*. One accustomed to that which comes fresh from the cow cannot be easily deceived in these qualities.

Next, by the *amount of cream* which rises upon it. This can be measured in a glass vessel (which a druggist will furnish), marked to hundredths, or, for less exact estimation, tenths. Good milk should yield at least eight parts in a hundred of its bulk as cream. Some Alderney cows will give a milk raising thirty or more per cent. of cream. The average of really good milk is probably about ten or twelve per cent. A vessel for measuring the cream is called a *cremometer*.

Also, the *specific gravity* is important; that is, the weight of the milk compared with that of water. Milk always weighs more than the same bulk of water. Cream is somewhat heavier than water, although lighter than milk, and hence floating upon it.

We take the specific gravity of milk by seeing how far into it a certain weight will sink. A specific gravity tube, or hydrometer, is a small glass fixture having a bulb containing mercury, and a lighter stem above, graduated (marked) to thousandths. The 1000 line is fixed by finding to what place the stem sinks in water. In milk, which is heavier, it will not sink so far. If the milk has been thinned with water, the hydrometer* will go down lower accordingly, and the difference can be read off on the scale. Such an instrument may be also called a *lactodensimeter*. The "*lactometer*" is constructed on the same principle, but is graduated differently, and the simple specific gravity tube (hydrometer) is to be preferred.

The specific gravity of pure milk, measured as above, ranges from 1028 to 1030. It ought, with good milk, to be at least 1029. An uncommon amount of cream may lighten it, but very seldom below 1028; never below 1027. If it be curdled by a few drops of acid, the *whey* then strained off from the curd should mark 1027 at least with the hydrometer.

Skimmed milk should not mark below 1029; it may often reach 1031 or 1032. Cream averages about 1025. We ought always to use *both* the cremometer and the lactodensimeter (hydrometer) for a careful examination.

If, then, a specimen of milk yields with the cremometer less than eight per cent. of cream, after standing twenty-four hours; if it has a specific gravity as low as 1027, and its skimmed milk has that of 1028 or less, we may be sure that it has been *watered*.

In case of inspection of milk under a law forbidding its adulteration,

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* This name has been given because it was first used to ascertain the amount of *water*, along with *alcohol*, in spirits more or less rectified by distillation.

the lactodensimeter standing in it at 1027, with the cremometer showing but six per cent. of cream, should condemn it without further question. The lactodensimeter at 1028, and cremometer seven or eight per cent., should cause suspicion, which should be confirmed or removed by *chemical analysis.*

This analysis requires the skill and apparatus of a chemist. Enough here to say, that its purpose is to determine, in the milk examined, 1, its whole amount of *solids* (after evaporation); 2, its proportion of *fat;* 3, that of its *solids not fat.* The *least allowable* proportion of solids in good, unwatered milk, is 11.5 per cent. by weight. It *ought* to contain 12.5 to 12.98 per cent. of solids, of which 9.2 to 9.3 are not fat, with 3.1 to 3.2 of fatty material, of which ether is the solvent in common use by analysts.

Good milk is a wholesome nutriment for men, women, and children, with very few exceptions. For hard-working adults, it is not sufficiently strong food to be depended upon alone. It is excellent for aged people, and the *staple* article for infants and children. *Condensed* milk has had a large part of its water removed by evaporation, and some sugar has been added. It answers very well when fresh pure milk cannot be obtained, and is very much better than poor or bad milk. I say *bad* milk, because such is sometimes wrongfully sold. Diseases, especially typhoid fever, and possibly diphtheria and scarlet fever, have been carried around and *dealt out,* we may say, with milk from a dairy in which foul water was used to wash the pans, if not added to the milk itself. Condensed milk must, of course, when used, have water added to it—six tablespoonfuls or more of water to each tablespoonful of it, well stirred together. This mixture looks and tastes like common milk, only sweeter. I have known a child to thrive on it alone as food, for months together. The constitution of a good specimen of condensed milk is as follows:

Water (parts by weight)	51.12
Fat	12.11
Casein	13.64
Milk-sugar	20.36
Ash (salts, etc.)	2.77
	100.00

Buttermilk is nourishing, and, to many people, pleasant and wholesome. Pure *cream* is, with most persons, quite as easily digested as milk. During illness, with prostration, and in convalescence, it is often very grateful and strengthening, as a force-giving, though (except for fat) not a tissue-restoring food.

Further remarks on the use of milk for *infants* (a very important subject) will be made later in the book, as a part of the Hygiene of Infancy.

STIMULANT BEVERAGES.

All men and other animals live by stimulation as well as by nutrition. Our good temperance readers may be somewhat shocked by this assertion, but it is true. What makes any one faint and fall when, for a moment, the heart ceases to beat? It is the absence from the brain of the *stimulus* of freshly-aired blood. Lay the body down, and a little more of this blood flows to the head by gravitation: then consciousness and animation return. Breathing goes on under the stimulation of the ends of certain nerves by carbon-saturated blood; circulation, under that of the blood acting upon the heart and arteries; digestion is kept up by the stimulus of food, which, through nerve-reflex action, draws the gastric juice and other digestive fluids into the stomach and intestines.

And so we might go on and show, that all the operations of the organs of the body are maintained under the influence of stimulating agents or agencies, every part indispensably requiring one or more of such to keep it in action.

Of course, *these* are *natural* stimulants, and therefore wholesome. What are we to say about artificial stimulation? From China and Japan to Paraguay and Peru, and from Labrador to Abyssinia, hundreds of millions of people, probably nine-tenths of the human race, take every day, besides food, something which exhilarates and refreshes them. Is this evidence of a law of nature? At least it shows a *want* of mankind: whether it be wisely met or not, is another question.

After childhood, in this "work-a-day" world, we all get tired from time to time. Civilized life has its regular succession of toils, cares, and rests, its worries as well as its labors. We rise expecting toil, we grow weary with it, and we go home looking not only for support but for refreshment. Even the idle crave excitement to break the monotony of doing nothing—often the most wearisome of all.

Well, then, if we admit that such a demand shows a law of human nature, it is to be farther asked about stimulation—of *what kind* shall it be? for *whom? when?* and *how much?* No more important questions exist in connection with personal hygiene.

First, let us notice what are the stimulants most commonly in use. They are of two kinds: those which do not produce intoxication, and those which do; **non-inebriant** and **inebriant** exhilarants.

UNINTOXICATING STIMULANTS.

The principal of these, used in various countries, are the following:

Tea, *Thea viridis and bohea.*
Coffee, *Caffea Arabica.*
Cocoa, *Theobroma cacao.*
Maté, *Ilex Paraguayensis.*
North American Tea, *Ilex Cassine.*
Coffee-leaf Tea.
Guarana, *Paullinia sorbilis.*
Abyssinian Tea, *Catha edulis.*
Labrador Tea, *Ledum palustris.*
Tasmanian Tea, *Myrtaceæ.*
Chicory, *Cichorium intybus.*
Grape-vine Leaf Tea.

These are not nearly all; *New Jersey Tea*, for instance (*Ceanothus Americana*), is omitted, because it has little or no stimulant quality of any kind.

Far the most important, in Europe and North America, are *Tea*, *Coffee*, and *Cocoa*. English, Dutch, and Russians (as well as Chinese), drink the most tea; Turks, French, Germans, and Americans, the most coffee; cocoa is the favorite beverage in Italy, Spain, and Central America. Maté is drunk by millions of people in South America; and chicory is taken instead of coffee by very many in Northern Europe.

TEA.

Native to China are at least two species of *Thea*, *viridis* and *bohea*. It is raised on hilly or undulating ground, not unlike that which, in other climates, is genial to the grape-vine. Japan and Assam (in Cochin China) also produce a great deal of good tea. The best that I have lately met with came from the Island of Formosa. It has been found possible to raise the Tea-plant with success in some parts of the United States, as Virginia, California, and even Iowa.

For *green* teas, the young leaves are gathered in the spring, heated in shallow pans over a brisk wood fire, thrown upon a table and rolled awhile with the hands; then put again upon the pan and quickly dried. *Black* teas (commonly called *Oolong*) are made of more mature leaves, which are first spread out or tossed about in the air for some time, then put in heaps and allowed to lie for more than an hour, so as to begin to ferment a little; rolled on a table, roasted in pans, and exposed for a few hours to the sun and air; lastly, dried slowly over charcoal fires.

Black teas are, as a rule, considerably less exciting to the nerves than the green, and hence are, in this country at least, much the most used.

Both kinds of tea are very often adulterated. Other leaves are mixed in with them, and sometimes flowers; also, with green tea, Prussian blue; with the black, catechu, black lead (graphite), indigo, turmeric, etc. None of these, in the quantities used, are poisonous. While some of the leaves are still whole, it is not difficult to make out the spurious kinds; if much broken up, the quality of the tea must be determined mainly by its *odor*, *taste*, and *effect* when used.

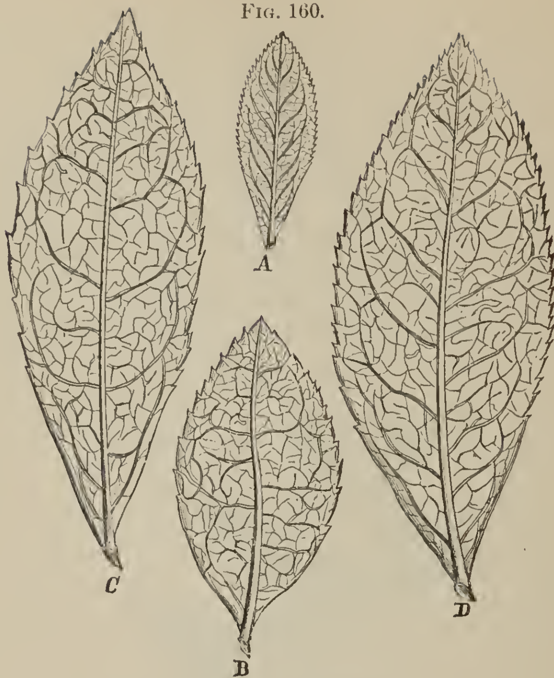
Chemists have found the principal active substance in tea to be the

FIG. 159.

TEA-PLANT.

same as that of coffee; hence it is called either *thein* or *caffein*. It is *nitrogenous* (consisting of C, H, O, and N), and is one of the vegetable *alkaloids;* that is, alkali-like vegetable principles. Many of these alkaloids are obtained from plants; some of them are very powerful agents, as *quinia* (quinine), *morphia*, *atropia*, *nicotin*, *strychnia*. All of these, as well as *thein* or *caffein*, act in different modes on the nervous system. They are used as medicines, but in over-dose are poisonous. Ten grains of pure thein, taken at once, would endanger the life of a man.

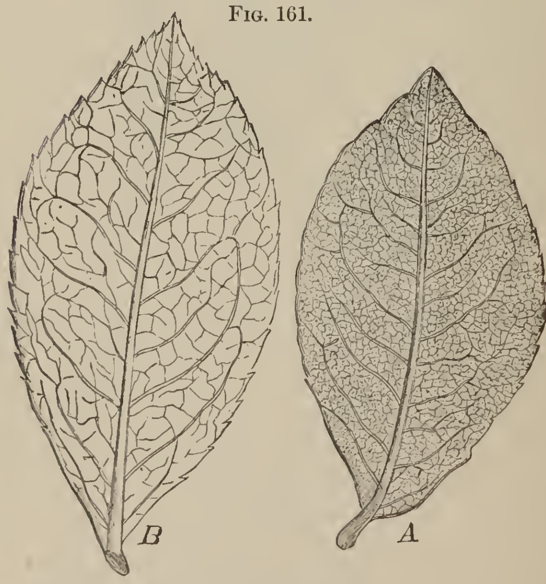
FIG. 160.



LEAVES OF THE TEA-PLANT.

A, Young leaf. B, Leaf of Black Tea of medium size. C, Leaf of Black Tea of larger growth
D, Leaf of the Green variety of the Tea-plant.

FIG. 161.



LEAVES OF CAMELLIA AND CHLORANTHUS, USED AS ADULTERATIONS OF TEA.

A, Leaf of Chloranthus Inconspicuus.

B, Leaf of Camellia Sasanqua; leaves used to adulterate Tea.

Composition of Tea.

Thein	1 to $3\frac{1}{2}$ per cent.
Volatile Oil	1 per cent. or less.
Gluten	20 to 25 per cent.
Tannic Acid, Starch, Gum, Fat, etc.	

With the *thein,* tea-leaves have as constituents also *gluten, starch,* a very little *gum* and *fatty* matter, enough *tannic acid* to blacken iron left long in contact with them, and a *volatile oil.* The last of these gives the pleasant *aroma* to tea of good quality. It is driven off by heat; therefore tea should not be *boiled* or heated very long before it is used.

The Russians make tea by putting the leaves into a teapot, pouring boiling water over it, and letting it stand *two minutes.* They then pour it into glass tumblers, sweeten, and flavor it with slices of lemon. In China and Japan it is made by pouring boiling water upon the leaves *in the cup,* just before it is used.

Old teas, however, require a little more action of heat to bring out their strength; although the Tartar fashion of boiling it for a long time deprives it of all aroma, and makes it harsh in taste. Scald the teapot with boiling water first. Then put in the leaves, cover them with boiling water, and let the pot stand a few (three or four) minutes with the lid on. Then take the teapot to the fire (unless you boil your water on the table in an urn with a spirit-lamp) and fill it with water which is *boiling at the time;* put on the lid again, and leave it to stand from two to five minutes covered. This will make a good pot of tea, if the tea itself is good; if not, no other way will do any better.

It is said that the Dutch East India Company first brought tea to England, early in the seventeenth century. The British East India Company began to import it about 1667, and kept the trade as a monopoly until fifty years ago. Before 1707 its price in England was twelve dollars a pound. Now, there are imported into the United States every year from sixty to seventy million pounds of tea. Each person in this country is estimated to use (if it were all equally divided, which, of course, it is not) from a pound to a pound and a quarter of tea annually.

Tea is a direct *brain*-stimulant. Nothing more surely quickens the thought-movement, and sets the tongue going; it "cheers but not inebriates." If obliged to write or speak when weary, I would rather have the *push* of a cup of tolerably strong tea than anything else, even coffee. An "old maid's tea-party" is famous for its abounding talkativeness. A successful lecturer whom I knew would take, after long

habituation, six or seven cups of tea (once *seventeen*) before beginning his discourse. This is an enormous excess, and unwholesome in its effects. Much use of strong tea promotes *nervousness* to a great degree; but, taken in moderation, it is, of all the positive stimulants, the safest and best *refresher* for daily use. Children are better without it—without *any* artificial stimulation whatever. Fresh air is appetizer enough for them; sleep their true rest-giver. Let them wait till they are old enough to begin to grow jaded with work and worry, before they begin to push or prop their brains and nerves even with black tea.

COFFEE.

Abyssinia has the credit of being the native land of the coffee shrub or tree, and Arabia has that of first finding out its properties. A prior

Fig. 162.

EGYPTIAN COFFEE-CUP.

of a convent there, it is said, long ago, was told by a goatherd of the exciting effect of its berries when eaten by his goats. He thought it might keep his monks awake during their devotions; on trying it, his

success brought coffee into the way of earning its world-wide reputation. It was introduced into Persia in the ninth century.

Coffee-berries grow on a small tree, about twelve feet high, with shiny leaves, not unlike those of the Camellia Japonica. It begins to bear when three years old, and will bear fruit for twenty or more years. The berries are red when ripe. Each contains two (rarely three) seeds. *Mocha* coffee (from Arabia) is the best.* The most delicious beverage

Fig. 163.

COFFEE-PLANT.

I ever tasted was a cup of Arabian coffee, made for me by a Bedouin sheik, under the shadow of the great Pyramid of Cheops in Egypt. In that country they pound the coffee-seeds to powder in a great mortar, instead of grinding it, and make it *in the cup*, pouring boiling water upon it. Their cups are small, and until recently were made of a yellowish-brown clay from the banks of the Nile. Instead of a saucer

* As we get it, however, it answers best when mixed with good Java coffee.

they use a little under-cup, with a neck and bottom like a wine-glass. The grain or seed of Mocha coffee is small, and of a dark-yellow color.

Java coffee ranks next in quality. Its grain is larger, and of a paler yellow. *Rio* coffee, from Brazil, is inferior, but is very extensively used. The color of its seeds is greenish or bluish gray. *Santos* coffee, from Southern Brazil, is very good. *Liberia* coffee (considered by some to be a different species) is latterly coming into use, being cultivated in Ceylon and elsewhere, as well as in Western Africa. It is said, but I do not know how truly, that keeping for several years will improve the flavor of the lower qualities of coffee.

Altogether, the world's annual crop of coffee is between eight and nine hundred million pounds; of which at least one-fourth part is consumed in the United States of America—about eight pounds a year for each inhabitant. The average amount of these beverages for Great Britain and Ireland is, each year, about one pound of coffee and four and a quarter pounds of tea; in this country, a pound or a pound and a quarter of tea to five pounds and three-quarters of coffee. As commonly prepared, however, one pound of tea goes as far as three pounds of coffee in use. In France, the estimated average amount of coffee is, for each person, two and a half pounds; Germany, four pounds; Denmark, five and a half; Switzerland, six; Belgium, eight and a half; Holland, ten and a half (one authority recently says eighteen) pounds annually. California (a fast place) beats the world in this, as it does in grapes and gold-nuggets, with about twenty pounds of coffee each for its population, excluding Indians and Chinese.

Composition of Coffee.

Caffein	$\frac{3}{4}$ per cent. or more.
Volatile Oil (natural) . . .	Less than in Tea.
Empyreumatic Oil (from roasting)	A variable but important amount.
Gluten	13 per cent.
Astringent principle . . .	Very little.
Fat and extractives.	

All the effects of coffee do not depend upon the *caffein* in it. After all of that has been removed, a strong dose of it has been still found to be poisonous to small animals. The *oils*, no doubt, have a share in its action. The natural volatile oil is very small in quantity. By roasting (not *burning*, which spoils it), another, called *empyreumatic* oil, is produced. Certainly, experience shows a difference in the respective effects of coffee and tea. Coffee acts more on the blood-circulation. Bernard, the great French physiologist, in trying upon animals the in-

fluence of various things on the *pressure of the blood in the vessels*,* found that coffee increased this more than anything else. In some persons strong coffee causes decided over-action of the heart. My conviction is that while tea acts most on the brain, coffee stimulates more the spinal marrow and the nerve-centres of organic life.

Thus coffee is less suitable than tea for every-day use as a beverage, but is admirably serviceable as a special stimulant at times of great fatigue. It has been found so in Arctic explorations during exposure from threatened shipwreck at sea and in army campaign life. During our great civil war, coffee was often called "the soldier's best friend," while whisky was proved to be his worst enemy. For those who are obliged to sit up all night with a sick person, a cup of coffee will give more help than a glass of wine.

Apart from its warmth as taken from the fire, coffee has some tendency to raise the temperature of the body—just the opposite of the effect of strong alcoholic beverages. Another effect has been ascribed to it by some experimenters, in common with tea as well as with alcohol: to lessen the *rate of waste* of the substance of the body. This can only do good when the rate of waste is too rapid. People who are *underfed* or *overworked* can get on better when they eke out their daily supply of food with coffee. It would be many times better, however, *not* to be underfed or overworked.

Besides wakefulness and over-action of the heart, the every-day use of coffee with some persons brings on *dyspepsia*. I have known this to happen with working-people taking three bowls of strong coffee daily; the mode of causation being proved by their getting well when the coffee was left off. One sign of the unfavorable action of coffee I have observed in myself: a sense of mental (cerebral) uneasiness or depression about two hours after it had been taken; a feeling as if "something was the matter"—I could not tell what.

The *immediate* effect of coffee (as of all stimulants) is so enlivening, that many who drink it will not believe it capable of doing them any harm. They overlook the after results, or ascribe them to some other cause. But I am confident that *most people are better without* using coffee as a daily drink, reserving it for times of unusual fatigue or exposure.

Milk does not render coffee any more digestible, but it lessens somewhat its exciting effect. If a *dyspeptic* should use it, he had better take *a little "café noir,"* black and strong, without milk. For others, half coffee and half milk or cream will do the least harm.

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* Ascertained by placing a tube in a large artery, and measuring the height of a column of mercury which the blood-pressure would sustain.

Dandelion coffee is generally made from the dried root of the dandelion plant, with about one-eighth part of real coffee added. It goes off freely by the kidneys, and stimulates the nervous centres much less than the same quantity of pure coffee. *Chicory* also is a weak nerve-stimulant, used without apparent injury by numbers of people in Northern Europe. *Roasted wheat* is sometimes made into an innocent drink, more or less reminding one of coffee. A stronger substitute lately proposed is the *kola* nut of tropical Africa, which has long been used by the natives of that land as a stimulant. It is said to contain more *caffein* than coffee, while otherwise resembling cacao (cocoa). Its properties and effects, however, have not yet been fully examined.

COCOA.

This is made from the hard fruit of a small tree, *Theobroma cacao*, native to South America. Most of it comes to the United States from Caraccas. It has nothing to do with the cocoanut,* which grows on a kind of palm tree.

The cacao fruit is a kind of small compound melon. It is prepared for use in several ways. Sometimes they roast it whole, and grind it into a paste with starch and sugar; or the husk is stripped off, and the seeds or beans are broken into fragments (cracked cocoa). Lastly, it is ground and mixed in a paste with sago, vanilla, cinnamon, and cloves, forming *chocolate*. This gets its name from chocolatl, a native American name for the cacao tree. But manufacturers mix it up otherwise also, as in Baker's and Whitman's cocoa, broma, etc.

Cocoa is nourishing, and easily digested, but very slightly stimulating.

Composition of Cocoa.

Theobromin	A variable amount.
Volatile Oil	Chiefly empyreumatic.
Fat (Cocoa Butter) . .	Over 50 per cent.
Starch and *Gluten* . . .	A considerable amount.

Theobromin is a nitrogenous principle, like thein or caffein; but, at least as met with in cocoa, much less stimulant to the brain and nerves than either tea or coffee. Cocoa may be taken freely, by people of all ages, without risk of harm, so long as it agrees with the stomach. Even

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* Still different also is the *coco* (colocasia esculenta), whose farinaceous tubers are eaten. *Coca* will be spoken of presently.

with the sick, this it usually does; and it is a very nice beverage for the sick-room; but, for a few persons, the amount of *fat* which it contains is too great for easy digestion. In some of the preparations of it that are sold, a good deal of the fat is removed.

FIG. 164.

CACAO TREE.

COCA LEAVES.

Peruvians have long been known by travellers to possess in their country a tree whose leaves they chew, with effects described as being wonderful. D'Orbigny, Von Tschudi, and Weddell tell of its enabling them to climb hills without getting out of breath, and to work day and

night, without sleep and almost without food, for several days together. They chew it with a little lime.

Sir Robert Christison, of Edinburgh, having obtained some of the leaves, tried them on himself and on some medical students. After getting tired with a sixteen-mile walk, two of the latter took some coca tea, felt refreshed, and walked for another hour without further fatigue. Others walked thirty miles a day under its use, scarcely feeling weary. Making all allowance for enthusiastic expectation, it must be concluded that the leaves of this tree (Erythroxylon coca) have a great power of nerve-stimulation. But no one need suppose that its influence is inexhaustible. Old people cannot with it renew their youth, nor the feeble acquire great strength. Its action is of the same kind as that of tea and coffee, although more specially observed in connection with the *motor* system (spinal cord and muscles).

The fascination which all nerve-excitants manifest is shown by coca in its having in South America victims of its habitual use in excess. These, called coqueros, grow so fond of it as to take it in enormous quantities, and to be rendered at last helpless "sots" by it; like drunkards, often irreclaimable.

Arsenic-eating somewhat resembles this habit. Stories about it were denied, several years ago, till some English physicians set on foot an inquiry concerning it. They found that in Styria (a part of the Austrian empire) a certain number of men and women were in the habit of eating a portion of white oxide of arsenic (from one-quarter of a grain to a grain or more) every day. The men took it to improve their "wind" in walking or working, and gave it to their horses for the same purpose; the young women ate it to beautify their complexions. Beginning with a little, their daily dose was gradually increased till they would take what would be enough to kill a person unaccustomed to it. No marked injury was reported to result from the practice; but its sudden abandonment would cause great prostration and distress. It may be taken for granted, however, that no effect of habit can altogether do away with the poisonous action of arsenic upon the system. It must, sooner or later, impair the health and shorten life.

ALCOHOL.

Of all stimulants, this has had far the most world-wide influence upon human life. Since the discovery of the process of distilling in the days of the alchemists, by which "ardent spirits" are got from fermented liquors, its harm-doing has much exceeded all its possible benefits. Before that time drunkenness with *wine* (as ancient as Noah), and other drinks allied to it, had been known as a great evil. But the awful curse of deadly intemperance belongs especially to the *spirit*-drinking nations of Northern Europe and America.

One may well wish, for this reason, that it were possible to rid the world entirely of the cause of so much evil. But this is not possible, although prohibition of the manufacture and importation of alcoholic beverages is now being agitated, and has been enacted in several of our States. We may be confident that a true knowledge of the facts concerning alcohol will be, in the end, better for mankind than the most extreme denunciation. Temperance itself should be temperate, standing only upon the foundation of truth.

What, then, is the truth concerning alcohol? Is it a food-substance? Let us look at its composition. Formed by the fermentation of sugar, it contains the same elements with it, namely, Carbon, Hydrogen, and Oxygen. Like sugar, it *might*, chemically speaking, furnish energy as a fuel-food. Experience must decide the question.

Large discussion about this, along with observation and direct experiment, have resulted in making the conclusion clear that alcohol is not a natural or suitable material of food for the human body during perfect health. Much, though not all* of it, when taken in small amount, is passed *unchanged* from the kidneys and from the lungs in breathing. If swallowed in great excess, as by those long intemperate, a portion of it remains in the body, stored up in the liver, brain, and other organs, where it has been found after death. Stories are told (not, however, probably true) of old topers, who have caught fire and burned like the wicks of spirit-lamps. It is just possible that enough alcohol may have been found after death in the interior of a drunkard's brain to take fire on the application of a lighted match.

There are conditions of the body in which, under disease, its relation to various agencies is altered. Ordinary food, at such times, may become almost poisonous, and poison may then become medicinal food. We do not eat iron in our natural every-day diet; yet iron pills or tinc-

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*Baudot, of Paris, Anstie, of London, and Binz, of Bonn, have proved this.

ture of iron may, exceptionally, do great good. Quinine and opium, likewise, are unsuitable for us during health; but they are of great value, and sometimes may save life, in disease.

So it proves to be the case with alcohol. It is not a natural food; it may be sometimes a medicinal food. The difference here is of immense importance. As a physician, I have given it and seen it given to a *great number* of patients, in hospital and private practice, and, when *carefully used,* I have never seen it do any harm; it has sometimes saved and prolonged life, and has left no untoward consequences. But all this is *in the treatment of disease.* Its action in health is another question.

What are its effects on the body during health? These are twofold —**immediate** and **secondary** effects. Its immediate action has several stages.

1. **Exhilaration.** Here alcohol resembles the "non-inebriant" stimulants, coffee and tea; but it acts, even in small doses, more upon the heart than tea, and more upon the smaller blood-vessels throughout the body than coffee. Still, there is an action of *very small* amounts of alcoholic beverages, which cheers and refreshes without marked disturbance of the system. This is what was meant by the ancient expression, "wine, that makes glad the heart of man." In Oriental countries, weak grape-juice wine, diluted with water (the custom in the times of which the Bible tells), will only intoxicate when taken in quite *large quantities.* Indeed, this is true of many of the common light wines made and used in European countries. Other wines, however, there made, and especially those prepared for exportation, are much more intoxicating.

2. **Hypæsthetic** action. I have to coin this word, as there is no term in the dictionary to take its place. *Anæsthetics* are such things as ether, chloroform, and nitrous oxide, which, when breathed, take away for the time all feeling. By *hypæsthetic* action I mean a *lowering* of sensibility only. One so affected does not feel pain, cold, or fear, in its *usual degree,* and, if left quiet, inclines to sleep. This is the action of the "night-cap" of Banting and of many others of "auld lang syne."

3. **Intoxication.** No description is (unhappily) necessary for this effect of large draughts of alcohol. Clearly, it is a case of poisoning. The word is well made up, from *toxicon,* Greek, meaning a poison. All the mental and most of the bodily powers are thereby deranged or impaired. The man staggers, because his motor nerve-centres are put all out of order. He talks nonsense or behaves outrageously; his higher brain-faculties are greatly disturbed, in the drink-frenzy. The face is flushed, the pulse is quickened, as alcohol excites the heart to overaction, and also promotes enlargement of the superficial blood-vessels.

The glow of redness which is seen on the face exists also in internal organs; brain, stomach, liver, kidneys, all are "flushed" with blood for the time; and when this effect is often repeated, it becomes habitual, to the great damage of those organs.

4. **Narcotism.** This last stage is that of *dead-drunkenness*—so well named. It is a stupor as deep as that of opium-poisoning, and it may, like that, end in death. Only large amounts of alcohol produce this result. But an important fact is, that *habit* makes a great difference in the susceptibility to the action of alcohol, as of all other stimulants and narcotics. An old toper will move about under a "load" of spirits which would kill at once any one not accustomed to it.

We may now look more closely at some of the effects of alcohol when taken even in moderate quantity during health.

1. It *hinders digestion*. This is asserted on the ground of experiments with artificial digestion: mixing meat or other food, cut up small, with water, chlorohydric acid, and pepsin, and keeping the mixture for some hours at the temperature of the human body. When alcohol is added to such a mixture, the time required for the digestion is longer than when it is left out. Qualifying facts in regard to its action when the body is not in a state of health will be alluded to hereafter.

2. It *impedes oxygenation of the blood*. Red blood-corpuscles, acted upon by alcohol, grow irregular in shape, and have a tendency to crowd together. Their absorption of the oxygen which is taken in by breathing, and their conveyance of it to the organs of the body, is interfered with. This effect is exceedingly like that of carbonic-acid gas, as we know this to be produced by *ill ventilation*.

3. It *excites the heart to over-action*, and thus *wastes energy*. This has been made a subject of close observation and study by Drs. Richardson and Parkes and Count Wollowicz. The last two observers selected a healthy young man, and first counted his heart-beats during days in which he drank nothing but water; then they gave him alcohol in some form every day in increasing quantities through another period; counting and recording the number of beats of his heart from time to time. The average number of beats in twenty-four hours during the *water* period was 106,000. Under the use of two or three glasses of brandy daily, it increased to 127,000; under four wineglassfuls of brandy, to 131,000; that is, 25,000 beats more than are natural in health.

Now, as every beat of the heart (a muscular organ) involves *work*, consumes force, this work has been carefully calculated in foot-tons. That is, if all the energy used in the heart's day's work were concentrated so as to lift a weight, it would be enough, ordinarily, to raise

about 120 tons one foot. But, under alcohol, the *overwork* of the heart amounted to one-fifth of its usual performance; equal to lifting, daily, twenty-four tons beyond its needs—all a pure waste of force!

4. It *impairs the power of the muscular system.* This, too, has been shown by experiment. A man cannot lift nearly so many pounds after swallowing two or three glasses of brandy or whisky as he could before taking it. We can explain this chiefly by the interruption which the presence of alcohol in the blood causes in the carrying of oxygen by the red corpuscles to the muscles. Here is a case given by Dr. W. B. Carpenter:*

"A captain of a vessel returning from Australia told me that she sprang a leak soon after leaving Sydney, and that as the wind did not allow him to put in at the Cape of Good Hope, nothing could be done but to endeavor to keep the ship afloat all the way home. At first, he issued to the men the regular allowance of grog; but he soon found that they were running down in strength. Labor at the pumps so constantly, fatigued them so greatly that at the end of the watch they would drink and turn in. At the end of four hours they would awake unrefreshed. He saw that this must be changed. He stopped the grog, and ordered that at the end of the watch each man should be given a mess of cocoa and sugar with his meat. This changed matters very much. They took this food before they turned in, and this sugared cocoa renewed the material of their muscles,† and put them into a condition in which they could sleep soundly and awake refreshed. He assured me that he brought his men into harbor, after all that severe work, in as high a condition as ever a crew came home."

5. It *retards tissue-change,* diminishing the rapidity of the action of the oxygen contained in the blood upon the substance of the different organs. This is very much like the effect of a *damper* in checking the draught (supply of air) of a stove or furnace. When a fire is burning *too fast,* lessening the draught is all right. If we stop off the draught when the fire is already dull, it will go out, and even a partial check of the draught may cause it to become "choked" with cinders and ashes.

So, in certain forms of disease, as advanced consumption and low fevers, it may sometimes be well to check the excessively rapid waste of the tissues which is going on. But in health it is *not* well to do any such thing. It causes the blood to become loaded with old and dead stuff that ought to be oxidized (burned) and carried out of the body.

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* Address on the Physiology of Alcoholics, Boston, 1882.

† That is, furnished *food-fuel* for oxygen combustion there.

The organs themselves, also, are not renewed and refreshed, as they ought to be, by the oxidation and renewal of their substance.

WHAT ALCOHOL WILL NOT DO.*

Some popular mistakes exist about this which have done much harm.

1. It will not "keep out the cold." Although there is a *feeling* of warmth shortly after taking drink, this does not last. By the thermometer, an hour after swallowing half a tumblerful of whisky, a man's body will show less heat than before it was taken. Throwing the blood to the surface makes the body *give off* its heat faster than usual. And, what is practically more to the purpose, it has been found, a number of times, that when exposed to the danger of being frozen to death, *those who drink much are the first to die*, and habitual abstainers from liquor are the most likely to survive. Drs. Kane and Hayes, as well as Sir John Richardson, found hot *tea* and *coffee*, not whisky, to be the best refreshments for men during the severe hardships of Arctic exploration. The same experience has been reported by sea-captains, under the fatigues and exposures of storm-stress and shipwreck.

2. Neither can alcohol make it easier "to bear great heat." The records of disease and mortality in the British army and navy, and among British residents in the East and West Indies, show that, *of all climates, the worst for the wine and whisky drinker is that of the tropics.* Moreover, the cases of fatal sunstroke (heat-stroke) are much more numerous amongst those who drink liquor than amongst any others.

3. Alcohol *does not increase working strength.* Professor Parkes, of the Army Medical School, England, brought this to the test of careful experiment. He thus confirmed fully the account quoted on a previous page from Dr. Carpenter, of the sea-captain who, when at a time of great fatigue, his men were giving out under the daily use of grog, found them to revive and get through their labor much better, after he withheld the grog and gave them cocoa and sugar with their meat instead.

4. It *affords no protection against dangerous diseases.* Many persons have imagined that, in malarious places, it would "keep off the chills." But the late Dr. Drake, of Ohio, who made a special study, by travel and correspondence, of the diseases of the Mississippi Valley, found that

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* The substance of what follows under this head has been embodied by the author in a "temperance tract," entitled "Some Popular Delusions."

this is not at all the case, either with regard to "country fever" (intermittent and remittent) or to yellow fever. Neither does it prove of any use at all in preventing epidemic cholera, in those present where it is prevailing. Also, it has been many times shown, that *when an intemperate man is attacked by cholera, he is almost sure to die.*

Hard water, containing an excessive amount of some saline matters, disagrees sometimes with travellers or visitors in regions where they drink it without having become accustomed to it. Very often, people put brandy into such water as a preventive of diarrhœa. But a much better as well as safer corrective (over and above drinking *very moderately* of strange waters while travelling) is the addition to the water of *a few drops* (five to fifteen drops in a tumblerful) of essence of ginger.

There is no disease, in any part of the world, against which the use of strong liquor can afford the slightest reliable protection. The best probability of escape from illness, or recovery from it if attacked, at the time of prevalence of any epidemic, is obtained by those who keep the even tenor of their way, with regular habits, in eating, drinking, sleeping, and all other particulars; maintaining the body *at par;* neither excited by stimulants nor depressed by living on rice-water or in constant fear.

PROBABILITY OF LIFE.*

	TEMPERATE.	INTEMPERATE.
At 20,	44.2 years.	15.6 years.
" 30,	36.5 "	13.8 "
" 40,	28.8 "	11.6 "
" 50,	21.25 "	10.8 "
" 60,	14.285 "	8.9 "

DOSAGE.

Very many people, even in the medical profession, fail to appreciate the importance of the *differences* in the effects of alcoholic drinks, according to whether they are taken in *large* or in *small* amounts. We have already seen that there are four stages or grades of their effects, when drunk during health. A small dose (say a *tablespoonful* of Sherry wine, or *half as much* whisky or brandy) will simply and slightly exhilarate, more or less, a person unused to it, without any approach to intoxication. Four tablespoonfuls (a wineglassful) of sherry, or two tablespoon-

* According to statistics of Beneficiary Societies.

fuls of whisky, may be felt a little in the head, with perhaps a certain lessening of sensibility, but still with no loss of self-control. Four wineglassfuls of strong wine, or two of brandy or whisky, taken on an empty stomach, will *intoxicate* some persons; others will only become reeling drunk on two or three times as much. But a pint of whisky, taken at once, will make almost any one, unless a confirmed habitual inebriate, dead-drunk—*narcotized* completely.

Now not only the *immediate effect* of alcohol is greater and *different,* according to the *dose,* but the danger of getting into the *habit* of using it is much increased therewith. This danger grows out of the immediate secondary effects of excessive stimulation. It is a law of vital activity, true of all the organs, that *every over-action is followed by depression.* This is as regular as the vibration of the pendulum. Borrowing a phrase from the stock-market, there is a natural *par* of action and excitement for each organ (heart, brain, etc.), and for the body as a whole. If forced *above par* by a special stimulation, relaxation and exhaustion follow; and the organ or the whole system will then fall *below par* just as far as it was pushed above it. This getting below par is an uncomfortable, often a distressed, condition; and when one who suffers with it finds that it can be relieved by *renewing the stimulation,* he is naturally disposed to resort to this. Each time, however, some *loss of tone,* of strength, results from the over-excitement. This loss of tone shows itself by the need of a *larger dose* to produce the same effect. So it goes on—excitement followed by depression, and this again by craving for more of the stimulant; deeper depression, stronger craving, and less self-control, week by week, year by year, till the *man* becomes a hopeless, helpless *sot!* The younger the victim, the more rapid usually is the ruin.

More than in proportion to the dose is the increase of danger from excess. It may even be said to be according to the *square* of the quantity taken. If one takes a glass of whisky daily, his tendency to increase the indulgence will have some force. Should he take regularly *two* glasses a day, his probability of becoming a "toper" will be *four* times as great as if he drank but one glass daily. A man may get drunk once a year, and then be "sick and sorry" for some time afterwards, without much difficulty in remaining sober between whiles. But one who goes to bed drunk every Saturday night, *this* year, will be almost certain *next* year to be more or less drunk every day and night of his life.

This relation to excess is, as I have said, very important: it is the main gist of the matter. I cannot assent to the opinion that alcohol is necessarily and *always poisonous* and demoralizing, even when given in

states of exhaustion and disease. During twenty years of practice as a physician, nearly half of that time seeing large numbers of patients in hospitals, my mind was brought by observation to the clear conclusion that *there is a place for alcohol in the treatment of disease;* but that it requires as much skill and care for its employment remedially as do opium, strychnia, and other potent drugs, which are *poisons* that *kill* when misused, but *medicines* that may *save life* when timely and properly administered.

In health it may be broadly laid down as a principle, that all use of alcoholic drinks is of the nature of excess; and every excess is attended by some danger of habitual inebriety. This is a sufficiently strong and large foundation for the support of a sound temperance platform. If more is claimed, it endangers the permanent safety of the superstructure. In other words, common sense, reinforced by science, refuses to accept the statement that alcohol is *never* useful or safe under any circumstances, even as a medicine. And whatever is rejected by well-informed common sense will not obtain a lasting control over the actions and institutions of men. Truth is always best, and will at last prevail.

Before going farther here, the *signs* of alcoholic excess must be mentioned. These are principally three: *quickening of the pulse, flushing of the face,* and *feeling the liquor in the head.* Either of these alone is mostly sufficient; all together they are decisive. I would never repeat the same dose, even in a serious case of disease, to a patient whose face was flushed and his pulse quickened after it, or who told me that he "felt it in his head" at the time. Either it should then be omitted altogether, or reduced in quantity.

SECONDARY EFFECTS.

"Horrors" we may well call what physicians have named **delirium tremens**, or *mania-a-potu.* Hard drinking, even for a few weeks with some, for months or years with others, often brings this on. Trembling, weakness, loss of appetite and digestion, and sleeplessness, with dreadful visions, especially at night, characterize it. Each attack risks life. A second spell is doubly dangerous; from a third, unless with long intervals between, the greater number do not recover.

Gout is the penalty rather of the moderate drinker's indulgence; following the use of wines and malt liquors more often than that of ardent spirits. It is a painful affection, coming in repeated attacks of

severe inflammation of the small joints, the toes, or fingers. Instead, however, of this "old-fashioned" kind of gout, it may fall upon the stomach or the heart, with terrible and even dangerous force; or it may be substituted by gravel in the bladder, or (especially if inherited) neuralgia in different parts of the body.

Chronic alcoholismus is a designation for the slow poisoning of the system by intemperance. It affects especially the **liver, kidneys, heart, arteries,** and **brain.** "Gin liver" is an old name for "cirrhosis" of that organ, with which many drunkards die. A farther account of this, and of other kindred disorders, may be best given later in this work, under **Domestic Medicine.**

METHOMANIA.

"Oinomania" means about the same thing in common usage, and so does *dipsomania.* It is the morbid and uncontrollable craving for intoxicating drink. Two forms of it exist—the *paroxysmal* and the *chronic* methomania. Persons subject to the first go off, from time to time, on "sprees," so tremendous as to end with their becoming helpless for the time. This stage passing off, such an one may continue quite sober, even abstinent, for weeks, months, or years; then having another ruinous attack. I have known a young man of excellent qualities and promise otherwise, in the midst of successful business, or when engaged to be married under the most favorable circumstances, to break up everything by suddenly disappearing for days together, and then being found half dead in a low groggery, or some other den of disgrace.

The *constant* inebriate, who, if he will, cannot escape from his habit, is still more often met with. Some English writers, very strangely, have denied the *uncontrollableness* of such intemperance. It has been very obvious to me, in a number of cases. A few authors, latterly, assert that real *insanity* always comes first, the irresistible propensity for liquor afterwards. That this is true as a general rule, or even as a frequent occurrence, I must deny. Excess in the use of alcoholic beverages does tend, *of itself,* to beget a habitual craving, which gains strength until, in time, *the will is enslaved* by it altogether. It ought not to be called *incurable;* but recovery from it is extremely difficult, and, in proportion to the great number of cases of it, rare. Trowbridge, the poet, has well expressed its power in the words of his "Vagabond":

> "I would *sell out heaven* for something warm,
> To ease this horrible inward sinking!"

Institutions are now maintained in several places (such as the Franklin Reformatory Home, in Philadelphia), where inebriates may live in retirement, out of the way of temptation, and under medical and moral treatment, for their restoration. One-third, nearly, of the number of those so cared for have regained health and sobriety. The time of seclusion, before returning to ordinary associations, ought not to be less than six months; better, a year.

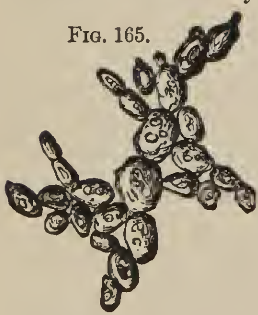
Any one who has ever been a habitual drunkard should never, after restoration, *taste a drop* of alcoholic drink, under any circumstances, of health or disease. For *such* persons, this rule should be quite absolute; the liability to the renewal of their old morbid craving is so great.

One of the worst results of intemperance is the injury to the health of the *offspring* of those who drink. Children of drunkards often die young, with convulsions or some form of acute brain disease. If they grow up, they are apt to be idiotic, insane, blind, deaf, or epileptic. Dr. Howe found that of three hundred idiots in the State of Massachusetts whose history was traced, one hundred and forty-five were the offspring of intemperate parents. In one family, where both father and mother were drunkards, there were seven idiotic children. Moreover, such children *inherit* a predisposition towards intemperance. If they drink at all, they are, more easily than others, made victims of the besetting habit. Physicians ought, when they know of such a family trait, to avoid prescribing alcoholic medicines for its members altogether.

STRENGTH OF BEVERAGES.

Beers are made by fermentation of malt, from grain, under the influence of yeast, the "ferment." **Wines** are spontaneously fermented from the juices of fruits. Grapes yield the best wines, but currants, elderberries, etc., will furnish vinous liquids; and cider from apples, as well as perry from pears, belongs to the same class. *Mead* is made by the fermentation of honey.

FIG. 165.



YEAST-FUNGUS (SACCHAROMYCES), MAGNIFIED 400 DIAMETERS.

All of these are examples of the change of *grape-sugar* into *alcohol* and *carbonic acid.* If the latter, the carbonic acid gas, is allowed to escape, the beverage is "still," as Madeira, Sherry, Claret, and a number of other wines. If the gas be retained by keeping the liquor in corked bottles, casks,

or otherwise, "sparkling" drinks result, as champagne wine, cider, ale, porter, etc. Spruce-beer, hoarhound beer, and similar home-made drinks, mead, and new cider, are the mildest, least alcoholic, of fermented beverages. Next come the lightest wines of the Rhine region, and of Italy and France; then lager beer and claret wines. After these, porter, ale, and brown stout. Champagne and hock wines of the finer grades follow in strength, the strongest wines being port (if genuine), Madeira, and (real Spanish) Sherry. None of these last contain more than twenty-five per cent. of alcohol.

Spirits are obtained by *distillation* of fermented liquors: *brandy* from wine; *whisky* from malt of grain (barley, corn, or rye); *gin* from

FIG. 166.

YEAST-FUNGUS, ADVANCED GROWTH; MAGNIFIED 220 DIAMETERS (HASSALL).

rye or barley, with juniper berries added; *rum* from fermented molasses. They all contain, when made in the usual way, about half alcohol and half water, being thus twice as strong as the strongest wines.

Undoubtedly, the danger of intemperance and of all the evils of *alcoholism* (except gout) is much greater, more than twice as great, with those who drink spirituous liquors, as whisky, brandy, gin or rum, than with those who use only fermented beverages. Suppression of the manufacture of *distilled spirits*, except in the form of absolute alcohol for the arts and for the making of medicinal preparations, would, if practicable, do very much towards arresting that grim procession of which we are often reminded, of 100,000 drunkards every year, going

to fill untimely graves. "Saloons" and "gin palaces," drinking *bars* of every kind, ought to be, and we may now hope will be, before a great while, everywhere abolished, by the improvement of laws and the advancement of civilization. So far, however, the most cultivated nations have taken their full share in the world's abuse of the "fruit of the vine" and of the product of the still.

Alcoholic Strength.

Lager Beer	4 to 8 per cent.
Ale	7 " 10 "
Champagne	6 " 12 "
Rhine Wines	6 " 15 "
Claret	6 " 15 "
Sherry	15 " 25 "
Madeira	16 " 25 "
Port	18 " 25 "
Brandy	50 " 60 "
Whisky	50 " 60 "
Gin	50 " 60 "
Rum	60 " 75 "

The *adulterations* of wines, beers, and spirits are various. Chemically manufactured wines are often sold, the greater part of which never came from the grape or any other fruit. *Cocculus Indicus* berries are sometimes added to English beer to give it a false strength. "Cognac brandy," so called, is now made in large amounts in France from potato spirit instead of from wine. This, as well as the fusel oil in some whiskies, and the compound called *absinthe* in France, are no doubt more rapidly poisonous, more directly promotive of delirium, insanity, and death, than "pure" liquors.* But the purest are dangerous enough, when taken in health, for us scarcely to need the alarm to be increased by dwelling upon their possible adulterations.

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* *Strychnia*, there is reason to believe, is not, as has been popularly supposed, ever added as an adulterant to liquors. It would not pay so to use it.

Most of the patent-medicine "bitters" and "tonics" contain a good deal of alcohol. making them very dangerous when taken habitually. Dr. Davenport, Massachusetts' State Chemist, found, for example, 29.3 per cent. of alcohol in Hoofland's German Tonic; Warner's "Safe" Tonic Bitters, 35.7 per cent.; Schenck's Sea-weed Tonic, 19.5 per cent.; &c. A report published in 1889 asserted that Buckland's Scotch Oats Essence contained 35 per cent. of alcohol; Boker's Stomach Bitters, 42.6; Parker's Tonic (advertised as "a purely vegetable extract"), 41.6; Hostetter's Stomach Bitters, 44.3; and so on. *Avoid them all!*

VARIOUS BEVERAGES.

In almost all parts of the world, people have found out the effects of fermentation upon natural juices, making them intoxicating; and, outside of as well as within Christendom, in several places, distilled liquors are made and drunk. One of the most curious of fermented drinks is the *chica mascada* of the South American Indians; produced by *chewing* grains of Indian corn (maize), so as to mix it with saliva, and then *spitting it out* and allowing it to undergo the change of its starch and sugar into a feebly alcoholic material. Travellers used to tell how the king of the Fiji Islands (before they were Christianized) had his morning drink prepared. A group of girls, selected for the purpose, would chew together a quantity of the native long-pepper root (*macropiper methysticum*), and spurt it out into a bowl, where it would soon ferment enough for the royal *ava* drink. This was then conveyed to his majesty, who, with a flourish of trumpets, would imbibe it; before which, no business of the day was allowed to be done by any one upon the islands.

Even the chilly air of the Arctic regions does not prevent the Eskimo from sometimes becoming inebriated by means of a kind of fungous plant; the *amanita muscaria*. In all temperate and tropical regions, something of the kind is more or less employed.

National Strong Drinks.

Chinese	Samshee,	from Rice.
Japanese	Sacie,	" "
Malays	Arrack,	" Rice or Areca.
Greeks	Raki,	" Rice.
Hindus	Toddy,	" Cocoanut Palm.
Hindus	Mirwa,	" Millet.
Arabians	Boozeh,	" Millet.
Russians	Quass,	" Rye.
Tartars	Koumiss,	" Mare's Milk.
Poles	Vodki,	" Potatoes.
Feejees	Ava,	" Long-pepper.
South Americans	Chica,	" Maize.
Mexicans	Pulque,	" Agave.
Mexicans	Aguardiente,	" Agave.
West Indians	Guarapo,	" Sugar-cane.

TOBACCO.

This "weed" is not a food for man, yet in universality of consumption nothing exceeds it except salt, and, perhaps, bread. Since Sir Walter Raleigh took it from America to England, its use has spread all over the world. Pope Urban VIII. issued against those who smoked it a bull of excommunication; King James I. wrote a royal protest, a "Counterblast to Tobacco;" one of the Russian Czars made its use punishable with the knout, and even with death; yet all in vain. Chinese, Turkish, and Persian monarchs have condemned it, and their priests have denounced it as contrary to their religion; yet, in those countries, every man, and many women, will smoke whenever they are not working, taking food, or asleep.

Nicot carried the tobacco-plant to France, and was immortalized by its name, *Nicotiana*. There are, at least, two species of it, *N. tabacum* and *N. rustica*. The former is grown in America, and also in Southern India; the latter in Northern India, Syria, and China. Perhaps there is also a third species, *N. persica*.

Three places yield the best tobacco in the world: a portion of Cuba, whence come *genuine* Havana cigars; Latakia, in Asia Minor, where the finest pipe-tobacco is produced; and Luzon, of the Philippine Islands, yielding the Manilla *cheroots*. In the United States, the plant can be raised successfully as far north as Connecticut. It exhausts the soil rapidly, as has been long since well known in Virginia.

Analyzing it, the important ingredients are: an oily and volatile alkaloid, *nicotin* or *nicotia*, which is deadly poisonous (two to eight per cent. of it is present in the tobacco leaf); a more volatile aromatic oil, formed chiefly in drying; and, when burned, as in smoking, an empyreumatic oil, somewhat volatile, whose odor is familiar in the smell of old pipes or stale tobacco smoke. It is curious that chemists have found in it also small amounts of those rather rare metals, lithium, cæsium, and rubidium. The last two of these were discovered by means of the spectroscope. Only one animal is found to live and thrive by eating tobacco; it is a little black mouse of Switzerland, first observed in a tobacco factory. Elephants and monkeys, however, have a certain liking for it. Perhaps, in this, they only copy man, as the lower animals generally take good care of themselves against poisons. It is not easy to persuade any animal (except man) to taste *alcoholic* beverages, after having once felt their effects. When forced or insinuated upon them, they show similar disturbances to those of human inebriates, and, if long subjected to their effects, die early. I am not sure that any like

observations have been made upon animals with the excessive consumption of tobacco.

When swallowed in large quantity, tobacco is a sedative (prostrating) poison. Vomiting may soon rid the stomach of it, otherwise a tablespoonful of it might kill a man, at least if unaccustomed to its use. An infant is said to have lost its life by having a tobacco leaf, moistened with liquor, left too long upon its chest as a remedy for croup.

As usually smoked or chewed, after the first *seasoning* sickness has been passed through, its effects are those of a gentle exhilarant and tranquillizing narcotic. Certainly there is a great fascination about it, as the habit is exceedingly hard to break off. It is, moreover, the *easiest* of habits to fall into, after once beginning. With a cigar or pipe in the pocket, and a match-box, or with a "plug" in one's own or a neighbor's handy possession, how naturally the weed finds its way to the mouth! Huxley's celebrated *man-automaton*, the French soldier whose brain had been damaged, was able to twist up and light a cigarette, when he knew nothing, and could do nothing else. This makes the principal danger of harm, from gradually increasing excess, in so facile an indulgence.

Worst of all the ways of using tobacco is chewing it; probably almost entirely an American barbarism. Next, is smoking strong cigars, especially the *last parts* of them, containing the most empyreumatic oil, besides the nicotin. Smoking a pipe is somewhat less injurious, as, with the cigar, some of the active principles are absorbed by direct contact with the mouth. Long pipes are used by the lazy Egyptians, who, sitting cross-legged, rest the bowl upon the ground. Some of them, also, with the *narghileh*, and the Hindus in like manner with the *hookah*, draw the smoke through water, which diminishes the poisonous effect.

Cigarettes, being small, may be supposed to favor great moderation in smoking. Enemies of the weed assert that they often (in their papers) contain arsenic or opium, or both, and are worse than cigars or pipes. This may be so; at all events, every one, and especially ladies and boys, may be safely encouraged to avoid them.

Snuff-taking is less common in this country than it was fifty years ago; and probably the same is true of Europe. In the seventeenth century, it was said that

> She that with pure tobacco will not prime
> Her nose, can be no lady of the time.

A magazine writer tells that Queen Charlotte was very fond of snuff. So were Frederick the Great and Napoleon; as well as Dr. Samuel Johnson. A tobacconist's advertisement, in 1740, named forty-six

varieties of snuff; from good Scotch at two shillings a pound, to the best Brazilian, at twelve times that price. Lord Petersham owned a stock of snuff worth three thousand pounds; with boxes almost enough to use one for every day in the year. Snuff-taking is simply a dirty practice, that is all; it cannot do harm at all in comparison with chewing, or even smoking.

Strangest of all, is the practice of "dipping;" said to be not uncommon amongst the women in some tobacco-growing States. They dip a small stick in snuff and rub their gums with it; often in small companies together. Odd devices, surely, people sometimes hit upon in the pursuit of pleasure!

Does tobacco, then, when used habitually, in plug, cigar, or pipe, seriously injure the health? Unquestionably it does. I have known a man so unnerved by it that he trembled constantly, and could not follow a line in writing across a page. Dr. Chapman, in his medical lectures, mentioned cases of actual *delirium tremens* produced by it. It *over-drives the heart*, as alcohol does. Dr. Edward Smith, in England, made careful observations upon this. One man's pulse went up, under eight minutes' smoking, from 75 to 106 in the minute. Another, with a *hookah*, drawing the smoke through camphor water, had an increase in six minutes up to 93 pulsations in the minute. Here is shown a great waste of force, just as in the case of alcoholic stimulation.

Moreover, the heart's action is often made *irregular* by excessive use of tobacco. Dr. B. W. Richardson found this to be the case in quite a number of habitual smokers. De Caisne, in France, observed the same thing. A noted oculist, Sichel, ascribed *blindness* to it; and Bricquet, nervous *deafness*.

Paralysis and *apoplexy* have been shown to be promoted by it; and even *insanity*. Dr. Kirkbride, of the Pennsylvania Hospital, reported that at least six patients there treated were certainly known to have become insane from excessive use of tobacco. He declared, from observation of its effects, that its use ought not to be allowed to insane patients; and that he had never seen the slightest injury from the immediate and complete breaking off of the habit. With those inclined to intemperance, smoking or chewing is believed to increase the craving for liquor.

Young persons are more injuriously affected than adults by tobacco. The authorities of Berne, Switzerland, have forbidden it to all under fifteen years of age. Louis Agassiz, himself a great smoker, as well as a hard worker in science, protested at Harvard against young students acquiring the habit. Bertillon, at Paris, examined into the state of things at the Polytechnic School, where there were 160 boys. Of these 102 smoked, while 58 did not. In every grade, the non-smokers held

the higher rank; and the smokers, as compared with the non-smokers, deteriorated from their entrance to the time of their leaving school. Hence the Minister of Public Instruction, in 1861, issued a circular throughout France, to the directors of colleges and schools, forbidding tobacco to their students, on the ground that the "physical as well as the intellectual development of many youths has been checked by its use."

Some years ago, Parton, the essayist, in a brilliant paper, "Does it Pay to Smoke," in the *Atlantic Monthly*, urged that "it is certain the coming man will not smoke." As he tells us, Raleigh, Milton, Locke, Addison, Burns, Byron, Campbell, Scott, Lamb, Thackeray, and other literary celebrities have been lovers of the weed. So were Daniel Webster and Henry Clay; and General Grant's cigar has accompanied him around the world. Goethe, the poet, and (probably) Washington, Franklin, and Jefferson, never smoked. John Quincy Adams was for a time a smoker, but abandoned the practice.

The question about those who have so indulged, as it is well put by this writer, is, *does it pay them?* He answers this decidedly in the negative. Sir Isaac Newton said, when asked why he never smoked a pipe, that it was because he was "unwilling to make to himself any necessities." This is an excellent reason. A man who cannot get his cigar, pipe, or "chew" at the usual time is uneasy; he may be unhappy—fairly miserable. Why should any one make himself a slave to a twisted leaf? Much better, let it alone. Besides, it is expensive, and annoys other people, especially the ladies. This, however, is not a *sanitary* reason; it is rather one of civilization and humanity.

We may cite Parton a little farther still. "The winning boat of Harvard University,* and the losing boat of Yale, were not rowed by smokers. One of the first things demanded of a young man who is going into training for a boat-race is, *stop smoking!*" "Let the Harvard crew smoke during the last two months of their training, and let the Yale men abstain, and there is one individual prepared to risk a small sum upon Yale's winning back her laurels."

But, if *training* is inevitably spoiled by even a moderate use of tobacco, should not a man who values the healthy condition of so splendid a machine as his body, and still more his brain, be *always* in training? None of us have anything to spare, in the constant conflict with the enemies to our health, everywhere around us. Nor should any one have a lower ideal, than to maintain, when possible, a *perfect* condition of his whole being, "body, mind, and spirit."

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* In 1867, probably, as this article appeared in February, 1868.

OPIUM.

This, one of the most useful of drugs in the relief of pain and the treatment of disease, has wrought almost as much mischief as alcohol by its abuse, as an indulgence by those in health. Most, but far from all, its victims are inhabitants of the warmer countries of the globe. More than five millions of pounds of it are said to be consumed annually in China; but Great Britain also is credited with the use of a quarter of a million of pounds a year. Large amounts of it (very much beyond its medicinal demand) are imported into this country; perhaps the greater part for Chinese immigrants, but the "opium habit" has also become to some extent a naturalized American vice.

Opium is collected from the seed-vessels of the poppy plant, *papaver somniferum*, whose flowers, unlike those of our garden poppy, are white. It flourishes in several Oriental lands, but is most largely cultivated in India. Thence, in spite of earnest and long-continued remonstrance by the Chinese government, it is sent to China, where its destructive effects may well be compared to those of intemperance in Western countries.

Fig. 167.

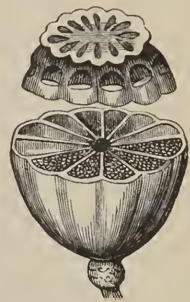
THE OPIUM POPPY.

Opium is generally smoked in the pipe by the Chinamen; chewed in substance by Mohammedans, in India, Persia, Turkey, and Egypt; drunk in the form of laudanum in Christendom. Since *morphia*, its most important ingredient, has been obtained from it, the solution of that alkaloid (or rather of its sulphate or some other compound), being largely used in medicine, has come to be substituted for laudanum to a certain extent as an excitant. Most singular is the fact that, as physicians not unfrequently inject morphia solution (in cases of great suffering) under the skin, by the *hypodermic syringe*, the use of this, too, has come with not a few persons to be a confirmed and difficultly-broken habit.

As with all other agents exercising much influence on the nervous system, opium has different effects according to *quantity*. Its first stage

of action, and the only one with a small or quite moderate dose, is brain-exhilaration. It quickens the wits, raises the spirits, and inspires confidence. Imagination is enlivened; some say that all the mental faculties are so; but this is doubtful. I cannot speak about it from experience; as when, a few times, I have had occasion to take it as a medicine, my system seemed to make no sort of pleasant response to it. But many of those who have used it speak enthusiastically of its influence. Visions of delight and exaltation, like those of Mohammed's paradise, are ascribed to it. De Quincey, who wrote the "Confessions of an Opium-Eater," described it as "happiness that can be bought for a penny, carried in the vest-pocket, or sent by mail to a friend." Alas, however, for the dismal reaction of the after-time!

Fig. 168.



SEED-CAPSULES OF THE OPIUM POPPY.

When taken in *full* dose, the time of exhilaration is short, and is followed by narcotic sleep. Of all medicines capable of this effect, opium is the surest, or rather the most nearly certain; a *few* people are not put to sleep unless by doses so large as to be dangerous. As a general rule, a grain of opium, from thirty to forty drops of laudanum, or a quarter of a grain of sulphate of morphia (with a person unaccustomed to its use) will cause drowsiness in less than an hour, followed by sleep, unless this be interfered with by great pain or excitement of the brain from some disturbing cause. When taken in much larger dose (say a tablespoonful of laudanum, or two or three grains of sulphate of morphia), a fatal stupor is brought on. The breathing becomes slow and heavily snoring (stertorous); the pulse also is slow; the patient cannot be roused; he is *comatose.* Unless relieved before the brain has been entirely overwhelmed by the poison, exhaustion comes on after several hours, and death ends the scene. We may know a case of opium-poisoning from dead-drunkenness by the different odor of the breath. From apoplexy it is to be distinguished chiefly by the history of the case; and so with compression of the brain from fracture of the skull. A *small pupil,* seen on lifting the eyelid, is one of the characteristics of opium narcotism.

Many persons, on waking from an opiate sleep, feel languid, inclined to headache, and with more or less tendency to sickness of the stomach. These effects are not universal when only occasional and moderate doses are taken; but when, as an indulgence, it is repeated, just as with every other stimulant, the system grows less susceptible to it, and the desired effect is reached only by increasing the quantity. Before very long,

great *misery* follows: wretchedness of body and mind. Digestion is almost ruined; the sallow face, sunken eyes, wasted body, and bad breath show the human wreck. All capacity for exertion is lost; business, family, society, become naught to one who falls down, down, down, into the opium abyss. From that bourne few travellers return; and they who do, like De Quincey, Samuel T. Coleridge, and others, tell a fearful tale of their suffering, struggle, and almost total despair.

Marvellously large amounts of opiates are taken by some of its *habitués.* In China, from fifteen to twenty grains (one grain being a medicinal *dose*) are very commonly smoked in a day. Some Chinese have been known to consume 200 grains daily for a time. At Aleppo, an European traveller saw a Turk swallow 180 grains in the morning, and as much again at night. Dr. Alexander Fleming knew a woman who took an ounce of morphia daily. Coleridge, the poet and philosopher, after fourteen years of the habit, drank four pints of laudanum in a week; once, a quart within twenty-four hours! The story of this man of genius, sage, and Christian, is among the saddest of modern times. Such was his craving for the drug, that even when under the care of kind friends for the cure of his habit, he would secretly procure laudanum and take it. At last, through grace and faith, he conquered this "old man of the mountain," the enemy of his life; but how much more and better might he have written, said, and done for the world without having needed such a conflict! And then his son, Hartley Coleridge, almost as brilliant as himself, inherited his proclivities; and sank to an early grave, a victim of intemperance.

Is there anything good to put against all this? Can any one be recompensed for the evils attending the opium habit? Never; always it is against reason and without consolation. But experience shows the need of caution in the use of opium in any form, even as a medicine. Both Coleridge and De Quincey began their acquaintance with its dangerous fascination while taking it to relieve the pains of illness. When a physician prescribes it, therefore, he must needs be sure first that it is really *appropriate* and important, then that *enough and no more* is given, and especially that it be *withdrawn* as soon as the occasion for its use has passed. Information of its dangers, too, ought to be given to those who are ignorant of them, when it is remedially advised.

It must be added here that a similar peril attends the unguarded medicinal use of another narcotic drug, *chloral.* Employed with propriety by physicians in certain cases to promote sleep, it may be abused by being taken when not needed; and so the *chloral habit* may grow and be disastrous. Dante Gabriel Rossetti, the poet and painter, almost certainly shortened his life by this habit; and not a few others have committed the same fatal error.

OTHER STIMULANT NARCOTICS.

Hasheesh is the most abused of all these, except opium. Millions of Asiatics, and many also probably in Africa, a few only in Europe, and probably none in America, smoke or chew it habitually.

It is the extract of *cannabis Indica,* or Indian hemp. Common hemp, however, *cannabis sativa,* has similar qualities, though not quite in so great strength. The effects of hasheesh are more variable and uncertain than those of opium. It excites and disorders the sensory and active powers more, the intellectual less. Malays run *amuck* after getting under its influence, striking right and left as they run wildly about. *Assassin* is a word said to be derived from hasheesh, because of its rage-provoking nature, as displayed among the followers of a once famous robber-chief of Western Asia.

Stimulant Narcotics.

Opium, Papaver Somniferum	China, etc.
Hasheesh, Cannabis Indica	Western Asia.
Arsenic, Arsenious acid	Styria.
Coca, Erythroxylon Coca	South America.
Betel Nut, Areca vatecha	Southern India.
Long Pepper, Macropiper methysticum.	S. Sea Islands.
Grains of Paradise, Amomum malagueta	W. Africa.
Kola or Guru Nut	Western Africa.
Laughing Plant	Southern Arabia.
Amanita Muscaria	Kamtschatka.

Chloral and *cocaine* (from *erythroxylon coca*) are both capable of doing much harm to those who get into the habit of using them: chloral being swallowed, and cocaine injected by means of a small hypodermic syringe under the skin. These powerful agents ought not to be used except under the advice and direction of a careful and skilful physician.

HYGIENE OF THE CIRCULATION.

As the "blood is the life" of the body, in so far as it furnishes both material and excitation for the activity of all the organs, a free and complete circulation is indispensable to health.

For this, the **heart** must be in a sound condition, and there must be no obstruction in any of the **arteries, veins,** or **capillaries.** Moreover, the due **proportion** of blood must pass to and through each part. Excess of blood anywhere is called **congestion,** either *active* or *passive.* The first is commonly attended by excitement; the latter, by torpor or disturbance of functional action. Over-excitement, however, is apt to be *followed* by passive accumulation of blood, with sluggishness of the organ affected.

Deficiency of blood-supply to a part leaves it with feeble power, and, if long continued, causes it to waste away. Cutting off the supply altogether endangers *mortification;* that is, the death of the part (*sloughing* or *gangrene*).

Most important to avoid *overloading* with blood is the *head.* For two reasons this is so. The brain cannot bear much pressure; and the close box, the skull, in which it is contained, will not yield and expand to relieve it, when more blood than usual enters it. Two natural provisions guard against great and sudden increase of blood-pressure within the head. One is, the *spirally-twisted* form of the arteries (*carotids* and *vertebrals,* see **Anatomy**) which carry blood to the brain. The other is the easy escape, under pressure, of the *serous* (watery) *fluid* within the arachnoid membrane, from the *brain* to the *spinal marrow,* where it is gradually diffused through a long distance, and is thus prevented from doing harm.

But, sometimes, the head *is* too full of blood. In fevers, it is often so; and it happens, occasionally, under other circumstances. Since the feet have no such delicate and important contents as the brain, and have no natural covering but the elastic skin, they may swell considerably without damage. Hence the very old and sensible rule, to "*keep the head cool and the feet warm.*" Also, for the same reason, a warm foot-bath is often a good thing to relieve headache (from a cold, etc.), by drawing the blood downwards.

Arteries are mostly so deeply seated and so protected in their situations as seldom to be subject to too great pressure. But the **veins** are, many of them, near the surface, and they may be obstructed, as by too tight a *cravat,* or too tight *garters.* Strangulation kills, not only by

arrest of breathing, but also by preventing the return of the blood from the head through the veins of the neck. Short of that, too tight pressure around the neck may cause fulness of the head, which, in a person predisposed to apoplexy, may be dangerous. Tight garters swell the veins of the legs. When this is done long and often, these veins may become *varicose;* that is, permanently enlarged.

But the **heart** must, most of all, be protected from disturbance. It naturally beats faster when any of the large muscles are working actively, as when we run or walk fast; especially up stairs. Our breathing is then hurried also; and thus, commonly, a check is put upon our doing too much: we "get out of breath," and have to stop or slacken our movement.

It is, however, possible to overtax the heart by running too long at a time, and doing this often for a considerable period. When the Philadelphia fire-engines were, formerly, drawn entirely by men, some firemen injured their hearts in this way. During the civil war, a number of soldiers, especially in the "Peninsular campaign" in Virginia, tired out their hearts by too much "double-quick" in marching; all the more so, because they were weakened at the same time by poor food, bad water, and discouragement.

When the heart is overworked, one of two things happens. If the body is at the time well nourished, and its general vitality is good, the heart *grows stronger*, just as other muscles do, with exercise. In time it grows thicker also; and this is the "hypertrophy" of medical books. But, if the overwork is incessant, the blood is thin and poor, and the sum of energy in the body is low, the heart becomes weak instead; its muscular fibres become pale and thin. In this condition they are easily stretched by the blood within the heart's cavities, and we have what doctors call "dilatation of the heart."

It is interesting to know that these opposite changes may occur, in different cases, from almost exactly the same immediate causes. When, from disease (such as rheumatic inflammation) one of the *valves* of the heart (see **Anatomy**) becomes obstructed, more effort on the part of the heart-muscle is necessary to force the blood through it. Then if (as above said) the blood is well nourished and the vital energy is good, this increase of work makes the heart grow stronger and thicker (hypertrophy). If, on the contrary, the blood is poor and the energy low, the muscular walls of the heart give out; they become thin and stretched (dilatation with attenuation of the heart).

Other causes besides active exercise may hurry the action of the heart during health. Strong feeling does so; as fear, anger, or passionate love. Thus, all the world speaks of the heart as the seat of the affec-

tions and passions. Also, stimulating drinks excite the heart; especially alcoholic beverages, and, with some persons at least, strong coffee. Smoking tobacco (except when, as at first, it sickens) has a similar effect. This is the case, also, with all modes of sensual indulgence. It is true that *overaction* of the heart does not always constitute *disease;* it may be "functional disorder" only.

Palpitation of the heart is often produced by indigestion, from sympathy of the heart with the stomach. Drinking a great deal of strong tea or coffee, particularly if, at the same time, the person lives a sedentary, inactive life, may bring on "nervous" palpitation. This is different from the overaction or irregular action of organic disease of the heart; in which either the valves or the muscular walls of the heart have undergone morbid alteration. One sign will generally suffice to distinguish between these two things. If there be *organic disease,* the disordered movement of the heart is made worse by active effort of any kind; but if it be nervous *palpitation* only, moderate but frequent exercise, especially in the open air, lessens it and promotes its cure.

Tight lacing does mischief and impairs health, sometimes causing sudden death, by cramping the motion of the heart, as well as the expansion of the lungs in breathing. It is an enormous mistake; all the more intolerable because the wasp-like shape which it gives to the female figure is unlovely as well as unnatural. No sculptor of classic Greece, no painter of Italy, in the days of Raphael, Michael Angelo, and Titian, ever gave to a goddess or a Madonna such a form as modern fashion has sometimes tortured its victims to obtain. It is worse than the Chinese lady's bandaging of her feet; because that is merely the cause of a deformity, while the cramping corset half stifles the healthy action of the most central and important organs of the body. Happily, there is, of late years, some gain in fashion in regard to this matter; in the direction both of good taste and of hygiene.

For the *balance* of the blood circulation to be rightly kept, there must not be much difference of *cold* or *heat* applied to *different parts. Sunstroke* exemplifies one possible effect of such a difference, when it results from the immediate shining of the sun on the head. *Taking cold* is a much more common instance of an opposite kind.

One sits awhile with his back to an open window, through which a cool, damp air enters. The part exposed is chilled; the blood-vessels in it contract, and force the blood elsewhere. If the lungs of the person be weak, blood may collect in them; *congestion* may follow, and then inflammation; *pneumonia.* This is worse than what takes place in most instances; but the general process at the beginning is of the same nature. Of this more will be said hereafter, when we come to consider the *Causation of Disease.*

CARE OF THE SKIN.

More than one use belongs to the "tegument" which covers the whole of our bodies. Some animals have a natural wrapping which is only protective: as the shell of the oyster, snail, nautilus, or tortoise; or the armor-plates of the armadillo; or the bony mail of the sturgeon. Almost as little endowed with feeling is the hide of the hippopotamus, rhinoceros, or elephant; and the fur of the seal, beaver, ermine, sable, and other animals, appears to be of use chiefly in keeping out the cold. Birds' feathers are spread out on their wings for flight; while their colors, we need not doubt, may be designed specially for the purpose of beauty.

Man's skin is, first, **protective**, Delicate as it is, its removal from any part shows, by the suffering produced, the importance of this service.

Secondly, it is **sensitive.** By touch, we learn much of the things around us, not only by our hands, but all over the body. Thus we are warned of danger when close at hand, and by experience come to avoid things which are injurious.

Thirdly, the skin **secretes** and **excretes.** These words do not mean exactly the same thing. Secretion in physiology is the separation of any material from the blood by a gland or "follicle." The latter (follicle) is a very small folding of a membrane, into which a little mucus or other fluid oozes by secretion. A *gland* is a collection of "cells," which take from the blood a material peculiar in each case: the salivary glands in the mouth secrete saliva; the liver, bile; the kidneys, urine; etc. The skin has *two* sorts of glands.

One kind, most numerous (on some parts of the body, over 2000 to a square inch) are the **sweat-glands**, secreting perspiration. The others are **hair-grease** glands, called "sebaceous;" they are most abundant near the hairs (see **Anatomy**). The latter keep the hair and skin supple and smooth. The *perspiration* prevents the skin from growing dry and harsh; but also, by *evaporation*, it cools the body when exposed to high heat; and lastly, it is **excretory**. That is, waste matter of the blood is thrown off by it, including some *carbonic-acid gas* and certain *salts*, which (although less concentrated) are not unlike those present in the excretion of the kidneys.

Because of the sensitiveness of the skin, an extensive injury to it, such as a large burn or scald, causes a great shock to the nervous system. Thus a bad burn may kill. But, besides this, the *excretory* action of

the skin is so important, that if it is suppressed over a large part of the body at once, the blood becomes poisoned by the waste (*effete*) matter retained, and this endangers life, or at least health.

Frogs breathe out more carbonic acid by their skins than we do; enough, it is said, to keep them alive for some time when air is not allowed to enter their lungs. Moreover, if they are closely covered all over with something which air cannot penetrate, they will die, *suffocated* (in a sense); their lungs not airing their blood fast enough.

A gum-elastic suit, fitted tight to the whole of a man's body, and kept there all day, would probably cause his death by *suppression of perspiration.* India-rubber is altogether unsuitable for use as a covering next to the skin, and even when farther off, as in rubber boots or shoes, it should be worn only while needed to keep out water, and then removed.

The subjects of most interest connected with the Hygiene of the Skin are **Clothing** and **Bathing.**

CLOTHING.

As we read in the Book of Genesis, clothes were first worn under a prompting of modesty after the fall. In some savage countries this is now hardly regarded. Amongst others ideas differ. In Mohammedan lands a woman's *face* must be concealed from the gaze of men under all circumstances, except when alone with her husband or parents; as to the limbs, they seem not to be minded so much. This is somewhat like the opposite ways of showing reverence: Christians, during the act of worship, uncover the head; Mohammedans, the feet.

When barbarians, such as the Fiji islanders, become Christianized, they wear clothes. Dr. Pickering, a great American traveller, says that in some of the South Sea Islands, as soon as the inhabitants, under the influence of missionaries, began to dress themselves, they grew liable to "take cold," which had never happened to them, in their mild climate, while they went without clothing. In cold countries, however, man would be unable to live unclad; and in the Arctic regions, the thickest furs of animals are necessary to retain the warmth of the body.

Clothing, for health, must be

1. **Sufficient** for comfortable warmth.
2. **Not excessive** in amount or pressure.
3. Properly **distributed** over the body.
4. Allowing **transpiration** of moisture.
5. **Changed** often enough for cleanliness.

Some persons, on the idea of *hardening* themselves, wear as little clothing in winter as possible; no undergarments, and no overcoats or cloaks. If already very robust, they may bear this, and get used to it; if not strong, they become chilled through, and may be seriously injured in health. To be in a cold place and *be warm enough* of one's own blood-heat is very well. But *to be chilly* is not good for anybody. The way to be hardened is to become gradually accustomed to exposures which one is quite able to meet.

It is a good deal (as we have said once before) like the way one's credit is established in business; by meeting every obligation as it comes; never incurring any which you cannot meet. So *excessive* exposure does not harden, but rather injures the constitution.

Still, it is a mistake to be *too* warm, or burdened with heavy unnecessary clothing. The same is true of covering at night. People differ much as to what they need. On the same night, one will want but a single blanket, another two or three; but every one ought to be **warm enough** to sleep comfortably.

Farmers have found, by actual trial, that it *costs more* to keep cattle out in the fields all winter than to shelter them; because, in order to keep warm out of doors they must *eat more food*, to furnish fuel for the natural combustion which sustains their warmth. This reminds us of the *adaptation* shown by the fact that the warmest-blooded of all mammals is the silver fox, whose home is in or near the frozen Arctic Zone.

Of course it is disadvantageous to wear *too much* clothing. It wearies and clogs movement with its weight, and promotes an excess of perspiration. Tight-lacing is even dangerous to life.

Just before hoop-skirts for ladies became fashionable (the last time), it was common for ladies to wear two, three, or more skirts to make an appearance of expansion from the waist to the feet; a most absurd custom, truly. The light hoops were innocent of much *pressure* at all events. The "chemiloon" and "skirt-suspenders" of the Dress Reformers of our times, must be decidedly better for health than garments which hang altogether upon the hips and press the abdomen downwards.

We should adapt the amount and quality of our clothing to the **weather.** Not by the almanac, however, as the seasons do not follow it exactly. Chinese people, it is said, having cool nights and very hot noons, begin the day with several light garments on. As the hours of morning bring warmth, off goes one thing after another, till by noonday they have only one or two covers left. With the cooling of the afternoon they again begin to put them on; and so, hour by hour, they get back to the morning's raiment. This is reasonable enough. Many persons among us make the mistake of wearing too little clothing (as well as keeping their houses too cool) in the changeable and uncertain weather of spring and autumn; and a large number of "colds" are caught in that way.

Of the **materials** in use for clothing, the warmest (besides furs) is wool. An open, porous fabric, containing air, conducts heat more slowly than a smooth, dense one; because air is itself a slow heat-conductor. So a tight-fitting kid glove scarcely keeps the hand warm, while a loose mitten is very comfortable in cold weather.

Silk is a slow conductor also, and it is warm for garments in proportion to its thickness. It conducts *electricity* very slowly, which makes it particularly suitable for undergarments with those who are liable to pains and aches on damp days, or when the wind is "easterly."

Next to wool and silk comes cotton (muslin); and the coolest of all are linen garments. These are most fit for midsummer wear, when our American climate is, by fits and starts, at least, tropical. Every one should be prepared, however, at all seasons with *extras* to put on in case

of sudden or unexpected changes. A prime rule of health is this: *never allow yourself to be chilly, if you can help it, for a single minute.*

Does clothing or bed-covering *make* any one warm? No. What do we use in summer to keep our ice from melting in the sick-room? Flannel. So also, in crossing the equator, sailors find flannel the best protection against unaccustomed heat; and the same service is rendered by it to engineers in boiler-rooms or other highly-heated places. The fact is, clothing acts simply as a **non-conductor.** It prevents or retards the exchange of heat between the body and the outer atmosphere. If we are warmer than the air, it keeps us from being chilled; if the air is hotter than we are, it prevents us from suffering so much with the heat.

It is true, however, that *thick* flannel is not comfortable in warm weather. The roughness of coarse flannel also stimulates the skin somewhat. This, and the absorption of perspiration in its pores, make it especially useful in protecting against taking cold when one is heated by active exercise.

In our variable climate, delicate persons, especially those liable to rheumatism or neuralgia, generally find advantage in wearing either *light* flannel or silk next to the body even through the summer, with a heavier kind, of course, for winter.

Ignorant persons sometimes (as I have known) will put a sick, feeble child into a cold bed, and pile clothing upon it to "make it warm." It won't do it. You should first *warm the bed* (and the child too), and then the blankets will enable it to *retain* its heat.

In the **distribution** of clothing over the body, the main part to keep warm is the **chest.** As it contains the heart and lungs, all the blood in the body passes through it constantly, and conveys its temperature everywhere. Moreover, chilling the heart or lungs endangers injury to those central organs themselves.

Next, the **abdomen** must be sufficiently protected. Great organs, the stomach, bowels, liver, spleen, kidneys, etc., are contained in it, and are all (most of all the bowels) liable to attacks of disorder from cold. Sudden *changes* of temperature often bring on diarrhœa; sometimes, cholera-morbus or dysentery.

A woman in the country, for example, in summer-time, lightly clad, remains at work in a hot kitchen for an hour or two, and then goes to her spring-house in the side of a bank or hill. In her kitchen the thermometer would show perhaps 90° Fahr. or more, the spring-house (or ice-house) 60° or below it. Is it any wonder if she "catches cold"? And *summer* colds are more apt to affect the bowels; winter colds, the organs within the chest. Thus we can see the advantage to Northern

soldiers, in our civil war, of wearing a flannel band around the abdomen while campaigning in the South.

Blacksmiths, engineers in boiler-rooms, furnace-men, glass-blowers, etc., find wearing flannel an excellent protection against exposure to excessive heat.

Then, the **extremities.** Of these, the **feet** must be best cared for. They are farthest from the heart, and nearest to the ground. Hence, at the same general temperature, they suffer most from cold. Children, in mild climates, may grow up accustomed to running about barefoot, if they have freedom and space to acquire active habits. But it is a great mistake to let the *legs* of *city* children (or their *arms*) be bare, for appearance's sake, in any but the warmest summer weather.

At the same temperature, children are more likely to be hurt by cold than grown people. Here is a case, from real life. A man and his wife, with two little children, had occasion to drive some twenty miles or so, on a very cold winter night, in an open wagon. They carefully wrapped the little ones, placed them in the bottom of the wagon behind them, and drove on, facing the wind themselves. Supposing the children to be all right, as they were quiet, they left them undisturbed, until, at the end of their journey, they found both of them frozen to death! The man and his wife were uninjured.

Hence we should put as warm clothing, and under-clothing, on the arms and legs of children, as we need ourselves at the same time.

As to bed-clothing, most people may have observed the fact, that we are always *colder when asleep* than when we are awake. One may lie comfortably under a light cover before falling asleep, and then almost at once be awakened by a chill.

Old persons are like young children in their small power to resist cold. Very old people may die, as some delicate plants do, just from exposure; a kind of cold-stroke. Albert Barnes, the excellent commentator upon the Bible, was thus, at an advanced age, chilled to death, upon walking a short distance from his home on a severe winter evening.

Transpiration (passage of vapor) from the skin through clothing is an indispensable condition of health. As already said, therefore, india-rubber will not answer for close-fitting garments.

On the accession of Leo X. to the papacy, there was a grand procession at Florence in his honor. A little girl was made to personate the Golden Age, by being coated, from head to foot, with gold-leaf. Before the day was over, she died in convulsions: *skin-asphyxiated* by her metallic covering. Aubert, in Germany, in 1873, ascertained by careful experiments that in the course of twenty-four hours a man exhales from his skin, in health and when at rest, sixty-two grains of carbonic-acid gas, besides effete (dead, worn-out) organic matter.

Changing clothes for cleanliness is not only decent, but eminently wholesome. Some of those who have been called the "great unwashed" among mankind seem, by living mostly out of doors, to keep tolerable health. But they are never well prepared to battle with disease or injury. Old clothes of soldiers in war time become, by long wearing, fearfully foul. Cases of fatal illness have been caused (I knew of two such during our war of 1861–65) just by exposure to their emanations.

No one ought to sleep in the same clothing as that worn during the day. Under-garments and all ought to be changed at night. Sick persons, confined to bed, need change of clothing oftener, even, than when they are well. If they are too feeble to be moved, this is a very great disadvantage to them. Nearly always, however, with care, a clean night-shirt or chemise can be got on every few days. The clean garment should be warmed, and a part of the patient's body only, a single arm, for example, should be uncovered at once, with as little sitting up (if weak) as possible.

Bed-covering should always be thrown down when one rises in the morning, to air the sheets for some time before the bed is re-made. I think I can *feel* the want of freshness in the sheets of a bed which has not been aired—in which it may be almost impossible to go to sleep. Dio Lewis tells of a patient of his who slept badly, but who recovered his slumbers on carrying out the prescription—*air your sheets every morning for two hours.*

While speaking of night-covering, a little may be remarked about the bedding. Feather beds are not liked by many in this country. The hair-mattress, well made, is excellent; people of tender bodies may have a feather bed laid under it. Husks and straw make the cheapest bedding; straw can, at least, be made comfortable, and can be changed sufficiently often without much expense. The ideal bed, to my mind, is a good, firm mattress, on a feather bed, and this upon a *wire* sacking, instead of the old style canvas sacking-bottom.

Ladies of fashion used to suffer, not more than half a century ago, from many errors in dress. Tight-lacing was, perhaps, the worst. Besides, however, they wore thin shoes in the coldest of weather; and attended balls and parties with bare necks and shoulders, and then, becoming heated with the dance or the promenade in close rooms, would stand by open windows to "cool off." Many a *pneumonia*, and not a few cases ending in *consumption* of the lungs, have thus been brought on. Another fault of female dress, hardly yet gone out, is that of *high-heeled shoes.* These distort the figure, rendering natural, wholesome exercise almost impossible.

Men's feet, as well as women's, are often tortured, almost *à la*

Chinoise, with *tight* shoes. The human foot has naturally a distinct *arch*, and spreads out with every tread. A good shoe should preserve this arch, and allow some room for the outspreading of the toes. How seldom does a man walk, in shoes or boots, with ease and grace! The most dignified walkers I have ever seen are the Egyptians (I was never in Turkey); who wear a kind of sandal, easy to the foot and without heels. Strangest of all are *wooden* shoes; still worn by some poor people in Europe, and even in England. They must be dreadfully clumsy for locomotion.

Stockings may be light or heavy, according to the season or climate; not many persons, however, out of the Arctic Zone, enjoy the *feel* of woollen stockings. For cold feet, exercise (when practicable) is the best remedy. Sick people must have their feet kept comfortably warm by artificial heat. *Frosted* feet are commonly got by going right to a fire or a warm-air flue with *very cold feet.* They ought to be always gradually warmed on coming in. A few people have such a slow circulation, that it is well for them, in winter, to sprinkle red pepper inside of their stockings, to help to keep their feet warm.

Hats are a modern invention; although *Arctic* people must always have worn fur caps of some kind. *Umbrellas* have been very anciently used to defend against the heat of the sun in Eastern Asia; but only within a century or two have they been known in Europe and America. The Greeks and Romans of historic times had little need of head-covering, except when journeying in bad weather. There was room, therefore, for the crown, or the bay or laurel-wreath upon their brows, when won in their many contests, mostly under the open sky. For the *tarboosh* or *fez* cap of the Mussulman, the head is shaved, except one lock at the crown; and, when in full dress, he puts a turban over the cap. Englishmen, in India or Egypt, often put green veils over their hats, the more effectually to protect them from the sun. This was the purpose, also, of the "havelock;" a white linen hood with a short cape falling upon the back of the neck and shoulders.

Heavy beaver or silk "stove-pipe" hats are most unreasonable. It is nearly certain that wearing them constantly promotes early baldness. *Felt* is a much more suitable material for men's hats. As for those of women at the present time, little can be said against them on the score of quantity. What next may follow, nobody can now tell. One of the best things about Fashion, however, both for health and beauty, is, in our age, that for want of Parisian leadership (since Eugénie fled with the ruin of the French Empire), many styles often compete; and so *taste* has a chance to lead, and is coming more and more to have control. *Outré*, semi-barbarous fashions, such as the Grecian bend or

enormous hoops, will hardly come in again in Christendom. Most objectionable of all things now is the thick, heavy *mourning veil.* For its counterpart we have to look far away to Turkish or Egyptian women, whose faces are always thickly covered while men are near. *Spotted* veils, now sometimes worn, are said by oculists to be very trying and injurious to the eyes. All veils must more or less interfere with the breathing of fresh air.

Concerning the skin, a word must be said of the evil of *cosmetics* and *hair-dyes*—rouge, face-powders, etc. Chemists have often examined and reported upon these. Nearly all of them contain mineral poisons in quantity sufficient to do harm, and sometimes to endanger life. *Let them all be avoided.* The best of all cosmetics is *fresh air;* the great beautifier is *health.*

Active *exercise* in the open air is so healthful for girls and women, as well as for boys and men, that it is a great misfortune for the feminine dress to be allowed to cramp or constrain the free movement of the limbs. This it always does when a long skirt is worn. The "gymnastic" costume is to be commended, not only for mountain climbing, but for skating, rowing, pedestrian excursions, tennis, and *all* activities. Let us hope that, "Bloomerism" being forgotten, we may soon have a reign of common sense in women's dress. Tight-lacing appears to be not much now in fashion; may it never be so again! Healthy women need no corsets, any more than men. Coroner's inquests were once not rare, over ladies who squeezed themselves to death, by impeding the right action of the heart and lungs with tight corsets. They are especially foolish, because the figure of a wasp is decidedly not that of a beautiful woman. Look at the most famous statues, of ancient or modern art. Had Venus or Minerva worn corsets, they never would have been idolized by the Greeks; for the ancient Greeks, whatever their faults, had good taste.

BATHING.

Almost all ancient nations made ablutions a part of their religion. Cleansing the body with water is a natural symbol of purification of the soul. For this reason, and because of the refreshment it gives in hot climates, as well as for cleanliness, bathing was common among the early Egyptians, Greeks, and Romans. "Divers washings" made a part of the Mosaic ritual of the Israelites; and they were continued to some extent by the Mohammedans. In ancient Rome there were at one time over 600 public baths. Some of these were very extensive; as those of Caracalla, whose ruins yet exist. In the Middle Ages, bathing was largely practised in Europe as a preventive of leprosy. Michelet asserts, however, that for centuries Europeans neglected bathing altogether.

Water-baths affect the body chiefly according to their temperature. They may be divided as follows:

Cold	32°–70° Fahr.
Cool	70°–85° "
Tepid	85°–90° "
Warm	90°–96° "
Hot	96°–100° "

Besides these, there are baths of

Vapór	100°–120°.
Hot air	130°–250°.

Of the cold or cool bath, the *direct* effect is *sedative* or depressing to the system. If one remains long in the water, this is its whole influence. But if soon out of it, in a tolerably warm place, a reaction occurs, in which a glow of warmth is felt. On a careful trial with a thermometer, I found, in one case, that there was a real rise of temperature of at least one degree, at the surface of the body.

Ordinarily it is this *reaction* after the cold bath that does good. Therefore one should not stay in it long at a time; the colder the water, the shorter the time of immersion. Some persons, moreover, have little or no reaction, and for these the cold bath is not suitable. The *shower-bath* answers for some who cannot derive benefit from the plunge-bath; the shock promotes reaction. *Infants* should not be bathed in cold water. At first, for them, it should be 90° at least.

By degrees, in the summer time, it may be lowered, watching the effects, to 85°, or, with some, 80° or 75°.

Tepid baths are always safe for adults and youth at least. When long continued, tepid water relaxes and softens the skin, producing the appearance seen on washerwomen's fingers.

Warm baths are decidedly relaxing. They are not beneficial to persons in health, but are often of valuable service in the treatment of disease.

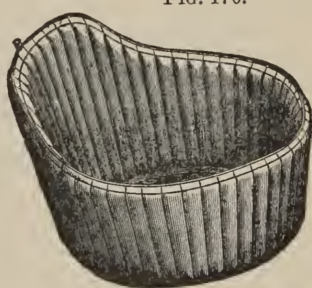
Hot baths excite the circulation of the blood, quickening the pulse and flushing the countenance. This is not good for any one in health. In certain states of the system, depressed in vitality, or suffering with painful joints, etc., hot bathing sometimes does much good.

Vapor baths are of use only in some states of disease. It is possible for a steam-bath to be so hot as to be dangerous to life; the use of such a remedy requires judgment, skill, and care.

Fig. 169.

A SIMPLE SHOWER-BATH.

Fig. 170.



HIP-BATH.

Hot-air baths, sometimes called Russian baths, must be always taken with *dry* air, so as to allow of free perspiration and evaporation from the body. This so mitigates the effect of heat that many people can bear an air-bath above 200° without inconvenience. Still, for persons in health, 130° to 150° will always be safer and better. Its special benefit is the thorough change of surface attending it, removing more of the epidermic "scales" (scarf-skin) than a water-bath will, unless at a temperature too high to be borne.

The **Turkish** bath includes immersion successively in water-baths of different temperatures, besides a good deal of rubbing. This also must very effectually cleanse and renew the surface of the skin. Those who have tried it consider it very enjoyable and refreshing.

One should never take a bath immediately after a meal; not for less than an hour (better two or three hours) after dinner. Neither should a cold or cool bath be taken when exhausted, or when the pulse is much

hurried by violent exercise. Best times for bathing are before dinner and before going to bed at night. A shower-bath may be very well taken before breakfast.

Sea bathing differs from fresh water bathing (besides its temperature, not the same at different places), in the *density* of salt water, making more pressure upon the exterior of the body; the *stimulating* action of the salt upon the skin, and the *absorption* of more or less saline matter, which acts upon the bowels and kidneys of some persons.

Because of the pressure being greater, it is easier to float in sea than in fresh water. But that pressure tends to force the blood towards the head; hence the importance of the rule, *always to wet the head* upon entering the surf, and repeatedly afterwards, so as to keep it cool and prevent fulness of blood in the head.

By the stimulation of the skin in sea water, it is made less chilling than fresh water at the same temperature. Still, experience (especially as observed by physicians stationed at Boulogne and other watering places) proves that *a short time* in the surf is much the best for health. *Fifteen minutes* will be long enough for the greatest advantage to people generally.

I have known a few persons to stay in the water at Atlantic City or Cape May for an hour at a time without apparent injury. Others, after half an hour, come out with blue lips and fingers; some with headache and languor; now and then one will suffer with diarrhœa. There is no doubt that fifteen or twenty minutes at a time in the surf on our shores will be long enough to do good to any one.

Not every one is benefited by sea-bathing. Very feeble, delicate persons, and those predisposed to apoplexy, should not risk it. For these, salt-water *sponging* may often be quite useful.

SUMMER SURF TEMPERATURES.*

Cape May	70°–80°	Fahr.
Florida Coast	87°–88°	"
Charleston, S. C.	86°–87°	"
Norfolk, Va.	81°–82°	"
Nantucket, R. I.	75°–76°	"
Portland, Me.	60°–61°	"
English Coast	68°–72°	"
Normandy	69°–70°	"
Baltic Sea	65°–66°	"
Mediterranean (Trieste)	85°–86°	"

* The average temperature of the Atlantic, out at sea, is about 56° Fahr.; of the Gulf Stream, 65°.

Daily bathing in fresh or salt water, at such a temperature as is followed by a good reaction and a feeling of refreshment, may be commended for all. But those who have not opportunity for it in the winter-time may keep their skins in a pretty good state by frequent ablutions without whole bathing. A particularly good habit is to wash the *neck, breast, and shoulders* (as well as face and hands) with *cold* water every morning upon rising. When this is done with a moderately rough rag or towel, it is sure to produce a brisk reaction at once; one is *warmed* by it. Sensitiveness to cold is thus lessened, and one is thus made a great deal less liable to take cold under ordinary exposure. At a time of sickness, however, warm or tepid water should generally be used for ablutions.

Some persons are annoyed by a strong odor from the armpits, which in a few cases is perceived by others near them. This is owing to an excessive amount of *excretion* by the glands of the skin in those regions. To prevent or remedy it, the *bowels* should be kept regularly and well open; the *general* state of the skin needs to be made healthy by frequent bathing, as well as by change of clothing, especially the undergarments; and the *armpits* should be well washed, morning and night, with *soap* and water. An agreeably scented soap will have in this case the best effect.

THE HAIR.

Hair is more like a vegetable growth than anything else belonging to the body. There is reason to believe that it and the nails may continue to grow for a few days after death.

Each hair has a root, which is *planted* in the skin, with one or two sebaceous (grease) glands close by it to maintain its suppleness. When left to grow naturally, the hair will acquire (as the eyelashes do, for example) a certain length. Cutting it promotes a longer growth, which, however, still has its limits. Many women have hair reaching to their waists or hips; a few, almost or quite to their feet.

Were we all living in a warm climate (of which Man was, no doubt, originally a native), and otherwise in a state of unsophisticated nature, we should have no need of cutting the hair in either sex. But, with clothing, warmed houses, hats, caps, etc., men's and women's heads have often a poor chance of raising a healthy crop. Like an overgrown grass-plot, the hair may become too thick, unhealthy, and threatened with dying out at the roots. As mowing is good for the grass, so then is shearing, more or less close and often, for the hair.

After severe illness, it is quite a common thing for the hair to fall out. Then it should be cut very short, or, still better, *shaved* from the scalp once or twice.

Should the head be *washed*, like other parts of the body? I believe this to be wholesome for the hair as well as for the system generally. Water alone does not easily remove the natural grease from the head. Soap should not be applied to the scalp, at least under ordinary circumstances.

Is it well to use *hair-grease?* Certainly not, unless the natural supply of unctuous material is deficient; and then in *very small amount*, and not often. If much is applied, it thickens, crusts, grows rancid, and irritates the scalp, to a great disadvantage.

A hair is a growing *tube*, filled with nourishing fluid. When old age comes on, the quantity of this fluid and its quality decline; hence the hair either grows pale and white, or withers, dies, and is not renewed. Some heads grow *bald*, others *gray* or silvery-white. An observing physician told me that all the *very* old people he had known have retained their hair on the top of the head, though white, to the last of their lives. This has generally, though not quite always, been the case with those whom I have known to approach or pass their ninetieth year.

If, then, anything interferes with the healthy nutrition of the scalp,

even in early life, it may suffer a premature "old age of the hair," while the rest of the body is still young, or at least not senescent. This may result from the debility caused by illness, or, as has been suggested, from irritation of the skin of the head. Heavy hats, nasty "chignons," once too fashionable, and living in hot rooms, are among the causes which may spoil the crop on the outside of the head, whatever may happen within it. Also, excessive care, or, perhaps, hard study, may bring on baldness or whiteness of the hair; by affecting the circulation of the blood, which is intimately connected within and without the skull. Instances (though few) are authentically recorded, in which fright, or sudden grief, has been followed by the whitening of the hair in a single night, or at least within a few days.

What ought to be done for early baldness? I believe in daily washing the head quickly with cold water. Adding a little whisky and salt to the water, and following the washing with a moderate brushing, producing a glow, without the least soreness (irritation), is also likely to stimulate the circulation favorably. Many hair washes are patented. The materials mostly contained in them are ammonia, cantharides, quinine, and castor-oil. These may do good, or, by excessive irritation, harm. If one wishes to try a stimulant in such a case, one of these will be as safe as any:

Take of Aromatic Spirit of Ammonia, Spirit of Rosemary, and Glycerin, each a fluidounce (two tablespoonfuls); Tincture of Cantharides (Spanish-fly), three fluidrachms (three teaspoonfuls); Rose-Water, enough to make eight fluidounces (half a pint). Mix, and use as a wash, daily.

Or, as an unguent:

Take of Balsam of Tolu, two drachms (by weight); Oil of Rosemary, twenty minims (twenty-five drops will do); Tincture of Cantharides, two fluidrachms (two teaspoonfuls); Castor-Oil, four fluidrachms (four teaspoonfuls); Lard, an ounce and a half (by weight). Mix, and rub nightly over the scalp.

Hair-dyes are easily obtainable which will make white black at will; but they are **dangerous.** It is next to impossible to dye the *hair* without wetting the *scalp* a good deal with the dye-stuff; and the effective agent in hair-dyes is *lead.* By its poisonous action, absorbed in this way, it is believed that some lives (among them that of Mademoiselle Mars, a famous actress) have been lost, and many persons have been seriously injured. The King of Sweden, some years ago, suffered a severe illness, ascribed by his physicians to the use of a "hair-restorer"; which, on examination, was found to contain a large amount of oxide

of lead. I subjoin Professor Chandler's account of his analysis of some popular preparations.*

Hair Restorers.

	Grains of Lead in 1 fl. oz.
Clark's Distilled Restorative	0.11
Chevalier's Life for the Hair	1.02
Circassian Hair Rejuvenator	2.71
Ayer's Hair Vigor	2.89
Prof. Wood's Hair Restorer	3.08
O'Brien's Hair Restorer, America	3.28
Gray's Celebrated Hair Restorative	3.39
Phalon's Vitalia	4.69
Ring's Vegetable Ambrosia	5.00
Mrs. S. A. Allen's World's Hair Restorer	5.57
L. Knittel Indian Hair Tonique	6.29
Hall's Vegetable Sicilian Hair Renewer	7.13
Dr. Tibbett's Physiological Hair Regenerator	7.44
Martha Washington Hair Restorative	9.80
Singer's Hair Restorative	16.39

Lotions for complexion—no injurious metals found except "Perry's Moth and Freckle Lotion;" that had in one fluidounce Mercury in solution, 2.67 gr.; Zinc, 0.99; and the sediment a little mercury, lead, and bismuth.

Of *Enamels* some are innocent of poisonous metals, but

Eugénie's Favorite has in one fl. oz.	108.94	gr. *lead.*
Phalon's Snow-white Enamel has in one fl. oz.	146.28	"
Phalon's Snow-white Oriental Cream has in one fl. oz.	190.99	"

As the **Beard** is as much a natural growth as the hair, it is remarkable that it should be common anywhere to remove it. In remote antiquity, the Egyptians shaved off their beards only as an act of mourning; at which time also the Jews sometimes tore their beards. One of the Levitical precepts is, "Thou shalt not mar the corners of thy beard." Alexander the Great, and, after him, the Romans, made their soldiers and gladiators go beardless, so as not to afford their adversaries a good hold in personal combat. Scipio Africanus, the Roman general, shaved every day. But Pliny says that all Romans, not in the ranks, were expected to wear their beards at full length after the age of

* New York Metropolitan Board of Health Report, 1869, pp. 565, 566, 567.

forty-nine years. Emperors of Rome were shaved until Adrian, who wore his beard to hide blemishes upon his face. His successors followed the same fashion until Constantine, who changed it again.

In more modern times, bearded faces were usual until a Papal nuncio at the Court of France originated the style of smoothness. Louis XIII. of France and Philip V. of Spain, being naturally almost beardless, confirmed this tendency; but, besides the shorn and tonsured monks, European men have mostly preferred nature's ornament and protection to remain upon their faces. Cromwell's "roundheads," in the days of the Commonwealth in England, made a strong contrast in this respect to the dashing "cavaliers" of the royalist party.

George Fox's "Friends," in the same century, although some of them wore their hair long, shaved their faces. Among persons of refinement, in England and the United States, fifty years ago, the moustache was hardly ever worn. Clergymen never, and even lawyers or "gentlemen" seldom, then thought of it. Gradually the custom spread from France and Germany to America, and more slowly to England. Now, ministers of the gospel often are "bearded like the pard"; and, in the United States, nine men out of ten wear the moustache, whether the cheeks and chin be smooth or not.

What reason is there for shaving? None at all, except ideas of appearance. In cold climates the beard is useful to protect the throat from cold. Even the moustache, if thick, may warm the air a little before it enters the nostrils. The time required for the use of the razor every day, from nose to throat, and ear to ear, appears to be entirely wasted; unless one can do as a learned friend of mine did, acquire a language by glancing from his mirror to a book, all the time while shaving himself.

THE TEETH.

While travelling in a Nile-boat, many years ago, I was struck with the whiteness of the teeth of the native crew, who were Egyptians, Nubians, and Arabs. Yet it is not likely there was a tooth-brush among them. Was it race, climate, or food that gave them such an advantage? On the other hand, I once saw a child, in Philadelphia, but three years old, every one of whose first teeth was already decayed. This, of course, was due to a constitutional defect. But most people in this country, and, I believe, in Europe also, lose some of their teeth by decay before they are forty, and not a few part with several before they are twenty years old, and have scarcely any left by middle age.

The causes of this early decay have been much discussed. The following have been suggested:

1. **Deficiency of lime** in our food, which is needed to make firm tooth-bone and enamel. This is not quite impossible, although our vegetables and meats both contain considerable lime. Probably the soil of a country affects animal growth somewhat by the quantity of lime in the water drunk, as well as in the food raised upon it. Cattle are said to be larger boned when pastured in a limestone region than when brought up where the water is all *soft;* that is, containing no excess of lime salts. The tallest men in this country are the Kentuckians, and their State has a great deal of calcareous matter in its soil. Still, it does not seem probable that there is so little lime in our food and water anywhere as much to affect our teeth, especially as *rickets* and other bone-diseases are less common in America than in Europe.

2. **Race.** Very likely there is something in the constitutional tendencies of races of men, which makes them liable to different defects and diseases. Possibly this has much to do with the difference mentioned in regard to the teeth. Negroes, brought up in this country, generally have good teeth, and keep them longer than white people, while using essentially the same water and food.

3. **Excess of acid** in our food has been thought by some to have an influence. But sour things are not very much eaten among us, and the vegetable acids, as vinegar and the fruit acids, also the animal lactic acid of sour milk, have but little power to dissolve the mineral matter of tooth-enamel, the hardest substance in the body. More than in any other way, acidity may act upon the teeth, when there is *indigestion;* some of the starch and sugar of the food undergoing the *acetous fermentation*, and the acid resulting finding its way to the mouth and remain-

ing there for a time. This is connected with the last cause to be mentioned, namely,

4. Eating too fast, **without sufficient chewing** of the food. Notoriously this is an American habit. Most people in this country are too much in a hurry about everything, and especially in eating. General Winfield Scott's "hasty plate of soup" was famously characteristic; but soup can be safely swallowed without chewing, while meat cannot. We are not furnished, like the dog and the *boa constrictor*, with stomachs capable of disposing of flesh in solid masses. Hence this practice makes many persons dyspeptic, and troubles them with acid eructations into the mouth.

More directly, however, imperfect chewing acts by leaving fibres of meat and vegetable substances between the teeth. There they undergo partial decay, and become nests, so to speak, for **parasites**, microscopically small, which make their home upon the surface and in the cracks between the teeth. Thus, by degrees, a crust is formed, which is known as the **tartar**. Of these parasitic growths the most abundant and important has received the name "*leptothrix buccalis*." Some dentists have thought "tartar" to be protective to the teeth, postponing their decay. Possibly it may so act to some extent; but much better for the duration of the enamel is a *smooth surface*, affording no lodgment for anything.

How, then, are we to preserve our teeth for the longest time? First, by taking care of our *general health;* secondly, by always *chewing our food thoroughly* before swallowing it; and thirdly, by **cleaning the teeth** effectually and often.

A rather hard brush is the best; not wide, as it need not rub the gums. It should be used *at least* once daily, upon rising in the morning. An excellent practice is to clean the teeth after each meal; to get rid (besides the use of the tooth-pick) of particles which may have lodged in the crevices between them.

Are *tooth-powders* necessary? Certainly not for children, or for any persons whose teeth are still perfectly sound and smooth. When roughness or tartar has begun to appear, a good tooth-powder may assist thorough cleansing. Instead, however, *pure castile soap* may answer the same purpose; touching a piece of it with the moistened brush just before using it.

A tooth-powder must not be coarse and rough, or it may wear away the enamel. A good combination is of *very fine* charcoal powder, castile soap, myrrh, and Peruvian bark.

Myrrh is one of the best of all preservatives of the teeth. A very convenient and useful way of employing it is to add about twenty or

thirty drops of tincture of myrrh to a quarter of a tumblerful of water, and use this mixture in cleaning the teeth and in rinsing the mouth afterwards.

When decay has begun, and *tenderness* is felt in an imperfect tooth, *pure tincture of myrrh,* applied directly to the offending part, will very often relieve the soreness and ward off trouble. It is, however, not strong enough to cure *severe pain* in a tooth; its value is as a *preventive.*

Disagreeable breath, except in those who eat onions, use tobacco, or drink strong liquor, is nearly always caused by *bad teeth.* A skilful dentist will make the best of these; by cleaning and filling those which are worth preserving, and removing the rest, making way for artificial substitutes. But, meanwhile, nothing is more immediately effectual in sweetening the breath than a strong mouth-wash of *tincture of myrrh and water,* used as just mentioned. On rising, before going into company, and before retiring to bed, the use of such a wash will mitigate the worst of breath-odors, and will remove all unpleasantness in most cases. Not many persons, after childhood, have the natural breath perfectly sweet, especially on first waking from sleep.

Toothache may be of three kinds. Least common is

1. Pure **neuralgia.** Face-ache, tic douloureux, and hemicrania are names given to this when, as is mostly the case, it extends all over one side of the face, or face and head.

2. More frequent is **inflammation of the jaw.** This may come from a "cold," when all the teeth are sound. But much most generally it starts in and about an imperfect tooth. A severe attack is attended by a great deal of pain, heat, and swelling of the side of the face affected. A large "gum-boil" is very apt to form; and when this breaks of itself or is opened, the discharge of matter is followed by relief. In rare instances the gathering opens outside on the cheek, sometimes leaving an ugly scar. The longest continued attacks are those in which matter collects *at the roots* of one or more of the teeth (seldom more than one); entire ease not being obtained until pulling the tooth lets the matter out.

3. Much most common is the aching of a decayed tooth with an **exposed** and **irritated pulp.** For this, *creasote,* carefully applied, is a seldom-failing remedy. Take a knitting- or darning-needle, wrap one end with a little bit of cotton, and dip this in a small bottle of pure creasote. Then, with a looking-glass (if the sufferer has to be the operator also) for guidance, push the moistened cotton right *into the hollow* of the aching tooth. It will give no pain, but will *relieve* the pain as soon as the creasote touches the exposed end of the nerve. A *red-hot*

iron wire will act in the same way; I remember seeing my father (who was a physician) cauterize his own hollow teeth with this. But, as creasote burns like a caustic when it touches the gums or lips, this should be avoided as far as possible; and a glass of cold water should be near to rinse the mouth with, if some should flow from the cotton and burn the neighboring parts.

Other local remedies for toothache which is caused by irritation of a hollow tooth, are laudanum, tobacco-smoke, pure whisky, chloroform, oil of peppermint, and oil of cloves. But none of these is so prompt and so certain in its action as creasote.

Some years ago, dentists discouraged the use of this remedy for toothache, upon the supposition that, by killing the nerve of the tooth, it would hasten its farther decay and destruction. I am sure this is not the case. In my own mouth I retained for fifteen or twenty years four teeth which had been thoroughly cauterized with creasote, to relieve pain, when they first began to give trouble from decay. I believe dentists have now given up the apprehension of any such injury from its use, and some employ it freely to prepare teeth for plugging, by removing their sensitiveness, through its cauterizing power. It seems to me *cruel* to plug a tooth without thus destroying the sensibility of the exposed end of the nerve, and the caustic action extends no farther.

EXCRETION: DISCHARGES.

As every fire, whether in grate, stove, or furnace, must have its ashes removed from time to time, or it will choke and go out, so every living body needs to be relieved of its *refuse* and *used-up* (effete) material. The **kidneys** and **large intestine** are, in man, **altogether** excretory; they have no other function. The **lungs, liver,** and **skin** are but partially so; they have other duties also to perform.

Under "**Healthy Breathing**" we have already considered the importance of the elimination (excretion) of carbonic acid gas, watery vapor, and organic material, by the lungs. This must go on, along with the reception of fresh oxygen into the blood in breathing, from moment to moment. Experiment has proved that, no matter how much oxygen may be supplied to the blood of an animal, *unless its carbonic acid is removed*, it will die in a short time.

We have, within a few pages, referred to the share taken by the **skin** in purifying the blood by excretion, along with its other offices (protection, sensibility, and moderation of heat). As to the **liver**, our power of influencing its condition and action is indirect and not very certain.

Heat stimulates the liver; very high heat may bring it into a state of disease. The *paté de foie gras* of epicures is made of the liver of a turkey or goose which has been tied for some days close to a fire. The bird's liver is thus put into a condition of *fatty degeneration;* not healthy, but tender, and agreeable to a fantastic taste. Tropical climates, as that of India, are those under which disorders of the liver are most common.

Rich, fatty food, also, is believed to excite the liver overmuch, and to promote its derangement. The term *biliousness*, however, is often vaguely and incorrectly used. People are said to be bilious when they merely have indigestion from irritation of the stomach, the liver not being involved at all. *Alcoholic liquors* of all kinds, when freely used, act injuriously upon the liver.

When there is disorder of the liver, its secretion of bile may be either *increased*, *diminished*, or *altered in character*. Alteration, again, may occur *with* either increase or diminution of the amount of bile secreted. Most generally there is a *lessening*, sometimes almost a *suppression*, of its formation. Then the matters which ought to be removed from the blood by the liver render the blood unhealthy (*toxæmia, cholæmia*); while some coloring and other material of the bile may be excreted by the glands of the mouth, in the mucous membranes of the eyes, and into

the skin. Then we have a *bitter taste* in the mouth, *sickness at the stomach*, *dizziness*, a *yellowish tongue*, *yellowish eyes* and *surface of the body.* If the last coloration be decided, it is called *jaundice.*

Prevention of liver disorder is to be cared for by avoiding exposure to extreme heat, eating only wholesome food in moderate quantity, drinking no alcoholic beverages, and keeping the bowels regularly open. *Treatment* of such disorders may be spoken of to the best advantage under **Domestic Medicine.**

Over the **kidneys** also we have only indirect and imperfect control. A special relation exists between the *skin* and the kidneys. When the skin is *chilled* and perspiration checked, the secretion of urine by the kidneys is *increased.* Conversely, in warm weather, when we perspire most freely, the flow of water from the kidneys is habitually less than in winter.

Thus the bad effects of exposure to cold are often mitigated. Checking perspiration suddenly always endangers the health; but the accumulation of waste material, including water, in the blood, would be much more serious, but for this relieving (vicarious) action of the kidneys. Sometimes the effect on the body of prolonged exposure to cold and wet is so great that *both skin and kidneys* are made to cease their work of excretion. Then disorder of the system must follow. *Dropsy* is one not infrequent result of such a state of things. At the worst, arrest of the secretion of the kidneys poisons the blood badly. This is called *uræmia*; and, if long continued, it ends in stupor and death.

We take care of our kidneys, then, as we take care of our skin; by maintaining a regular though not excessive warmth of the body, with sufficiently frequent bathing, change of clothing, etc.

But it must not be forgotten that the kidneys, like the liver, are affected by our *diet* also. Highly seasoned food (excess of pepper, mustard, or spices) stimulates the kidneys; but much more unfavorable is the action of strong or largely imbibed *alcoholic liquors.* Among the maladies included under the term *chronic alcoholism*, kidney disease (some forms of which are called Bright's disease) is very commonly met with; and, when once produced in this way, it is not often recovered from.

THE BOWELS.

Here we have much room for care of the health. Man's large intestine (see **Anatomy**) has no office except the removal of two sorts of waste: 1. Incompletely digested materials of food; 2. Effete matter excreted by the *glands* of the intestine from the *blood.* This matter is the most *putrescent* (undergoing the most offensive kind of decomposition) of all that escapes from the blood.

Since such matters must be removed, whether we are active or inactive, and whatever the amount of food, we see why *sick* persons must still have their bowels opened, even when they are lying still in bed, and take little or no nourishment. Indeed, as decomposition goes on in the blood during sickness more rapidly than during health, it is *more* important, during *acute* illness at least, for the sick person to be so relieved daily than it is for those who are in health.

One daily emptying of the lower bowel is natural and most suitable for ninety-nine in a hundred people. Exceptions are met with. Accounts are recorded of some extraordinary ones; as of the Dutch General Grose, who lived for thirty years without an evacuation. A student of the University of Pennsylvania told me in 1874 of a blacksmith whom he knew to have lived to be seventy-four years old, who for forty years had a movement of the bowels but once in nine days; yet with ordinary health otherwise. When at sea, I have passed seven days without the least disposition toward a movement, and a relative of mine has, also at sea, been eleven days without it.

On the other hand, a not inconsiderable minority of persons have the bowels moved twice daily while in perfect health. *Once* should be regarded as the standard. It is a good thing to have a *habit* of such movement at the same time every day. Most people can best arrange for this right after breakfast; some just before retiring to rest at night. When there is sluggishness of the lower bowel, gentle *pressure,* alternately on the two sides of the abdomen, may assist in getting relief.

Several causes promote constipation of the bowels. First, *neglect* in responding promptly to the call of nature. The *rectum* (lowest and last part of the large intestine) is not constructed to *retain* anything, but only to *transmit* and throw out what descends from the colon into it. If it is compelled to detain anything, it contracts upon it, rendering it less easy of subsequent removal; and at the same time the coats or walls of the rectum (through its mucous membrane) will absorb into the blood much of the watery material present. Thus the blood

becomes more or less poisoned; and the disposition of the bowel to empty itself is gradually lessened, establishing a *habit* of constipation.

Secondly, without neglect, there may be sometimes a *want of power* in the muscular coat of the bowels; their "peristaltic" action is slow and incomplete.

Thirdly, often connected with this, and bringing it on, there is an *insufficient supply* of *nervous energy* to the intestinal canal. Studious persons, professional and much pressed business men, are most likely to use their nerve-force so exhaustively in their daily pursuits, that too little is left for bodily organic functions. Sedentary people also, as bookkeepers, clerks, and tailors, may suffer in a similar way, because of the want of stirring up of their bodily energies by active exercise. As a rule, out-of-door activity promotes the regular movement of the bowels.

Fourthly, under some circumstances the *secretory action* of the glands of the large intestine is not sufficient. In fever (except *typhoid* fever) this is quite generally the case; it is so in the first stage of most diseases (as measles, scarlet fever, small-pox, etc.), which begin with depression, followed by fever. Many dyspeptics and others, however, in their ordinary condition, without fever, have an over-dry state of the mucous membrane of the bowels, inducing constipation.

It is not a trifling matter to be irregular in this excretory function. Although many persons get on tolerably with a costive habit, there are possibilities, we may say dangers, attending it, not to be overlooked.

One of these is *irritation of the bowels*, which may be, by some aggravating cause, urged on to a serious *inflammation*. Another is the creation of swellings called *piles*, or *hemorrhoids*, near the outlet of the bowel (within or without it), which are often painful, sometimes bleeding, and generally troublesome.

Worse is the forcing, by straining at stool, of a *hernia* or *rupture*. This is an escape of a knuckle of intestine or membrane (*peritoneum;* see Anatomy) out under the skin at the groin, or, especially in women, at the navel; making a soft swelling, sometimes difficult to get back into its place. If this becomes *greatly* swollen, it is *caught* and *held* at the place it escaped through. Then its circulation is cut off; it becomes a *strangulated* rupture or hernia. *Mortification* follows, unless this is soon relieved; and the sufferer more often dies than recovers from this.

More uncommonly, neglected constipation may cause such a collection of hardening material in the intestine as at last to obstruct it altogether, and not even purgative medicine will remove it. This is one form of *obstruction of the bowels*. It is one of the most dangerous of all the accidents (if so to be called) to which the body is liable.

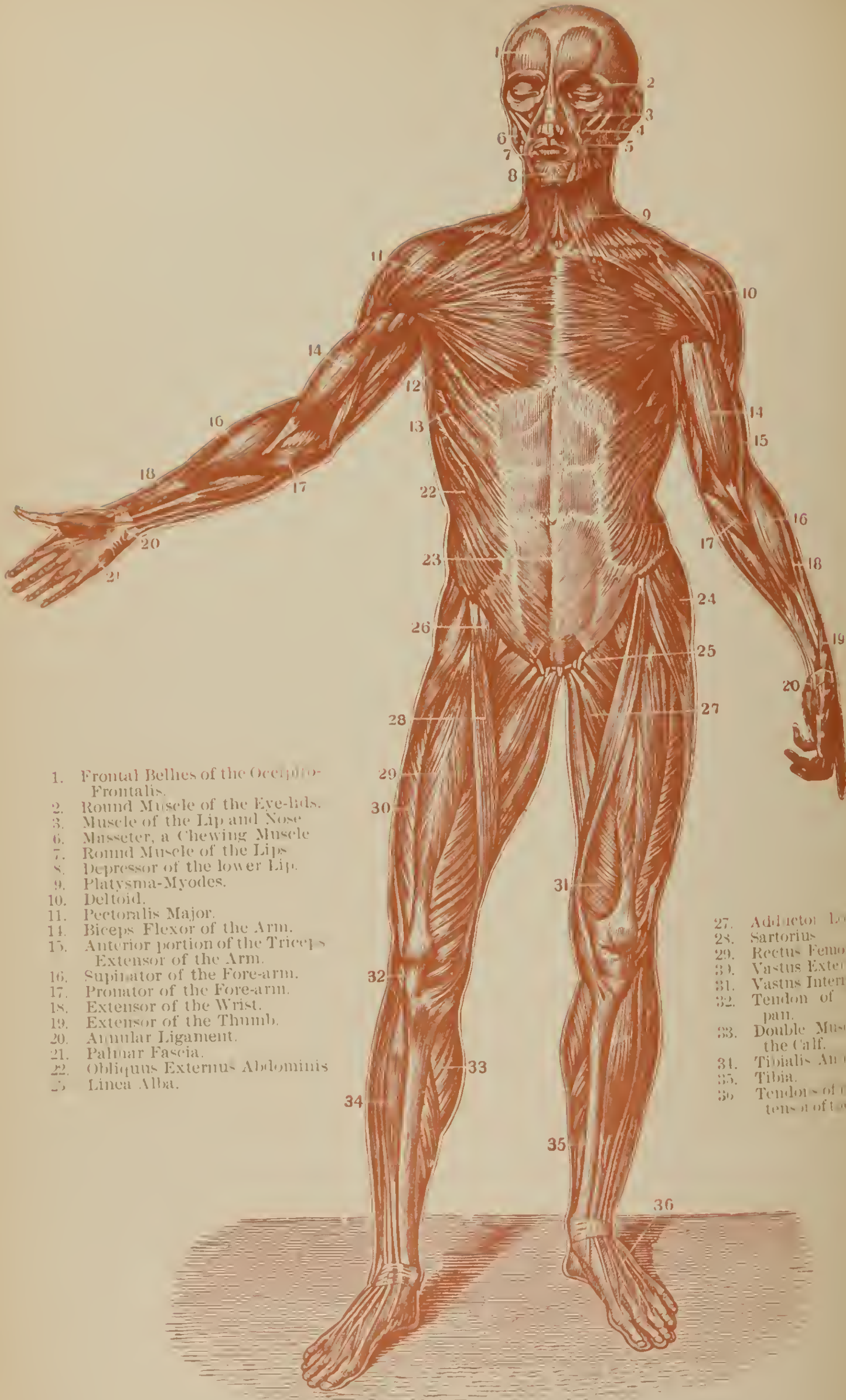
Also, when the large intestine is *worried* with what it ought to be rid of, the *stomach, liver,* and *head* may sympathize with it; and we may have nausea, "biliousness," and headache, as well as a general sense of indisposition and languor. Dyspeptics usually suffer thus; and they are very apt to make their friends and neighbors sympathize with their affliction.

Lastly, as has been said, want of action of the bowels allows the *blood* to be more or less tainted or poisoned by the retention in it of waste putrescent material. This again acts unfavorably upon the brain and other organs; the whole system being at a disadvantage for want of fresh, pure blood.

How are we to secure regularity of the bowels? Establish the *habit* as early as possible in life. *Never,* if it can be at all avoided, *wait* five minutes, after becoming aware of the occasion, before relieving the lower bowel. If inclined to be costive, besides active *exercise* according to one's strength, eat every day some *fresh fruit.* If that which is fresh cannot be had, *stewed* fruit (especially stewed prunes) may answer the purpose. *Bran bread,* also, is laxative with many persons.

Should these means not be sufficient, medicine may be required. Without advice of a physician, the drug most safe and suitable to venture upon for costiveness is *rhubarb.* Dyspeptics often purchase this (root) in lump, and cut off a nightly portion as an offhand-made pill. Simple rhubarb pills of the apothecary shop will, of course, do very well. Trial will soon show how large an amount is needed; and in this, as with other use of drugs, the *smallest sufficient* dose is always the best.

Gluten suppositories (to be slipped into the lower bowel) made by the Health Food Co., Arch street above 7th street, Philadelphia, have been found by a number of persons very convenient and effective to relieve constipation. (On constipation in young children, see page 432.)



1. Frontal Bellies of the Occipito-Frontalis.
2. Round Muscle of the Eye-lids.
3. Muscle of the Lip and Nose
6. Masseter, a Chewing Muscle
7. Round Muscle of the Lips
8. Depressor of the lower Lip.
9. Platysma-Myodes.
10. Deltoid.
11. Pectoralis Major.
14. Biceps Flexor of the Arm.
15. Anterior portion of the Triceps Extensor of the Arm.
16. Supinator of the Fore-arm.
17. Pronator of the Fore-arm.
18. Extensor of the Wrist.
19. Extensor of the Thumb.
20. Annular Ligament.
21. Palmar Fascia.
22. Obliquus Externus Abdominis
23. Linea Alba.

27. Adductor L[illegible]
28. Sartorius
29. Rectus Femo[illegible]
30. Vastus Exter[illegible]
31. Vastus Inter[illegible]
32. Tendon of K[illegible] pan.
33. Double Mus[illegible] the Calf.
34. Tibialis An[illegible]
35. Tibia.
36. Tendons of the [illegible] tensor of the [illegible]

ANTERIOR VIEW OF THE MUSCLES OF THE BODY.

MUSCULAR EXERCISE.

How are people made strong?

First, by **natural constitution.** We differ originally in the *capacity* of our muscular system, as we do in height, weight, and length of limb. But most persons never reach the strength they *might* attain.

Secondly, by the best possible care of the **general health.** Unless there is a good sum of power in the body as a whole, of course the muscular system falls short in energy.

Thirdly, by **exercise.** This must be rightly proportioned, however, or it will not increase strength. *Overwork causes not a gain of strength, but weakness.*

Some people misunderstand this very much in regard to the sick and those who are delicate. "Take exercise and get strong," they say. But perhaps they have not strength enough for any active exercise; hardly enough to sit up all day. Those who have ordinary strength can increase it only by using their muscles within the mark of what they *could* do possibly. There is an old saying that "a horse that has run his best will never run very well again."

Dr. Winship, not long ago the strongest man in America, lifting over 2200 pounds at once, told of himself that, when a young man, he had only average strength. Something occurring to make him wish himself stronger, he set to work to cultivate his muscular powers. He found the best way for it to be to exercise *often*, but *not long at a time.* Seldom did he prolong his practice with weights, bars, lifting, etc., for more than half an hour at once; and in that time several different things would be done. On this plan he doubled his strength in a few months, and trebled it in a year or two; and his opinion was that any healthy person, by frequent short exercises, especially in the open air, can double or treble his or her strength in the same way.

The *conditions* necessary for keeping the muscles in good order are those required for the healthy nutrition of every organ of the body; namely:

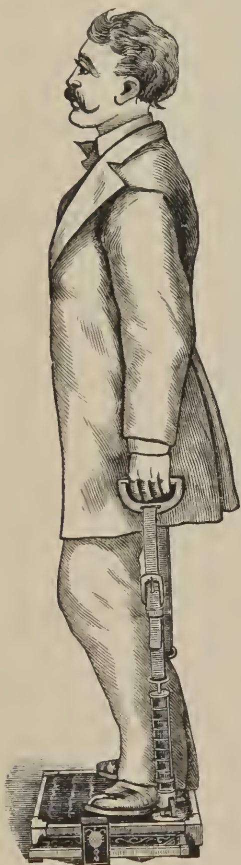
1. Good, rich **blood**;
2. **Distribution** of blood, and of nerve-force, without obstruction, to each part;
3. **Exercise** of the organs, according to their ability;
4. Sufficient intervals of **repose.**

Everybody knows that we must have sleep for several hours in each twenty-four, or we wear out. Besides sleep, however, which affects the brain only, there must be *rest from action* in all the *muscles.* Our hearts

beat on, day and night; they rest only *between beats.* Our breathing muscles heave the chest and lower the diaphragm, sixteen to eighteen times in every minute; but while we are breathing *out,* they rest. Nothing that labors can do without shorter or longer periods of repose.

Even very short times of rest help. After a muscle contracts, more blood flows towards it. This gives it new "fuel" for energy, and more "stimulation," too. Try the principle for yourself, in this way. Take a pair of (either light or heavy) dumb-bells, and raise them above your head as many times as you can, without being much fatigued by it. Then rest for *two or three minutes,* and try it again. Almost certainly, you can lift them two or three times more than before. Rest again. Probably then you can raise the weights *several* times more than the first or second time.

Fig. 171.



THE HEALTH-LIFT.

The *health-lift* is made to act usefully on the same principle.

Finding, by trial, how many pounds one may lift with comparative ease, that weight is raised once. Then, after a rest of about three minutes, nearly always from twenty to fifty pounds more may be lifted, without any greater apparent effort. Again a rest; and another addition can usually be made. Of course there is a limit to this, commonly found, after the third or fourth trial, each time. By this means good exercise for a number of muscles can be obtained in a short time; although the general effect on the system is much less beneficial than that of longer continued active out-of-door exercise.

In *rowing,* it has seemed to me that this idea of *short rests for accumulation of power* may be, and has been (perhaps without thinking about it) carried out. Some years ago, I noted, on account of its bearing on the physiology of exercise, the *rate of pulling* in the boats in the great prize contests, at home and abroad. It appeared not improbable that the Harvard crew lost, in its admirably contested race against the Oxford University crew in England, about fifteen years since, by *too quick a stroke.* The Harvard men pulled 42 strokes a minute, the Oxford men 40. In 1870, the Cambridge crew (England) beat the Oxford men, the first time for several years, on 38 strokes to

the minute. On our side of the ocean, in 1874, the Columbia College crew won against the other college boats at Saratoga, on 34 to 35 strokes per minute; "*a quick hard pull and rather slow recovery.*" The Oxford men beat the Cambridge crew in 1875, on 35 and 36 strokes to the minute; and in 1876 Cambridge again beat Oxford, both averaging 37 strokes; Oxford varying from 35 to 40, in "spurts."* (As to the relation of these great *contests* to health, I will have a few words to say presently.)

About *modes* of exercise next. **Walking** is excellent; unsurpassed in benefit to the system if one can afford time to get enough of it; a pleasant country, moderate weather, and good company being almost essential to its advantages. Beginners must not walk too fast or too far. Stop at the end of the first hour, and sit down for five minutes. Rest ten minutes at the end of the second, and every successive hour, if you go on long; and never, while unaccustomed to pedestrianism, go more than three miles in one hour. What Weston, Rowell, O'Leary, and Fitzgerald can do is, for the beginner, about as impossible as it would be for one of them to leap over a barn.

Riding on **horseback** is an admirable exercise; but it leaves neglected a number of useful muscles, which are brought into action in walking. Farmers in some places ride on horseback almost always, if they have to go a mile or more; and, in consequence, they become poor walkers. They often almost wear out in an hour's stroll over hard pavements in town. **Bicycling** much resembles riding in effect.

Driving in a carriage (unless with a hard-mouthed horse or over a bouncing rough road) is a *gentle*, indeed what may be called **passive,** exercise. It is good for "airing," a change of mental impressions, and enjoyment; but it does very little toward muscular cultivation.

Nearly the same may be said of **sailing** in smooth water. Those who manage a sail-boat in a good breeze and on rough water may have an exercising time, and so, perhaps, may their passengers—whether they *stomach* it well or not.

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* In the race of 1883, Harvard won with 35, 34 and 37 strokes, and Yale lost with 42, 41 and 43 to the minute. On Lake George, the same year, the Princeton College crew led at first with 40 strokes, but at the end came out third in the race; Cornell beat all, with at first 34, and afterwards a *spurt* of 38 strokes to the minute. In the single scull race on Lake Calumet, in Michigan, July 4, 1883, young Teemer won easily with an even stroke of 32 to the minute.

A partial exception occurred in June, 1884, in the victory of Yale over Harvard with 39 strokes, Harvard rowing the same till near the end, when its rate was 35. A more decided instance was, on the same day, the Columbia College Freshmen beating the Harvard freshmen, the former with 42 to 40, and the latter 39 to 36, strokes per minute. On the whole, it is evident that the *kind of stroke* has a great influence, as well as the strength and endurance of those who handle the oars.

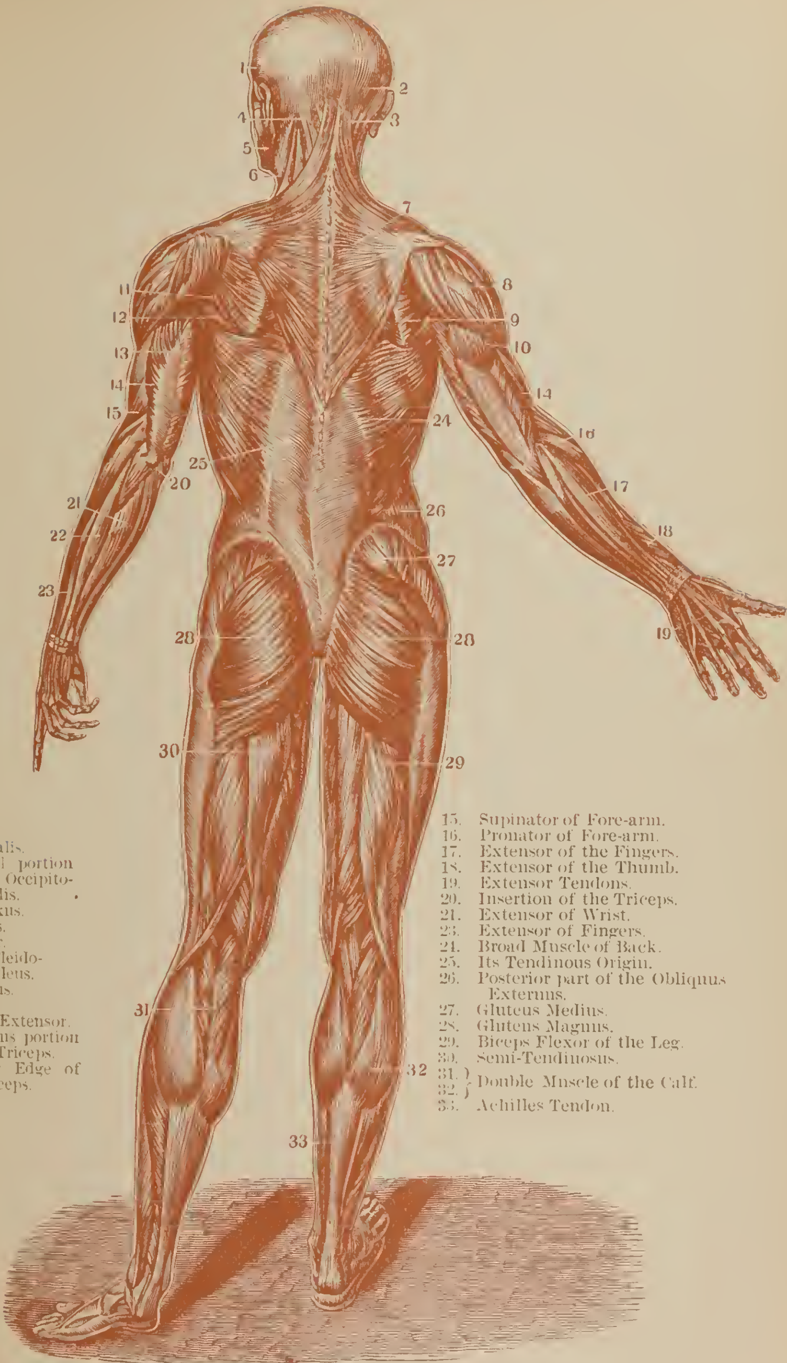
Rowing is a capital exercise. More muscles are used in it than in walking or riding on horseback; hands, arms, back, legs, and feet are all strengthened by it. Enough has been said of it already, a few pages back.

Skating is as wholesome in itself as any exercise can be. Always in a cold, bracing atmosphere (except *roller* skating, of course, which may be anywhere), even in a "rink," with freedom and variety of movement of the body and limbs, yet without violence, it is excellent for both sexes. Not many years ago it was very popular in our Northern cities. An alarm got about that skating is not good for girls and women. This is untrue, except so far as belongs to *imprudence.* Skating in pleasant company is, to those who are skilful in it, delightful enough to tempt some to keep it up *too long,* and get *over-tired.* This, of course, is beneficial to nobody, and may do considerable harm to those who are delicate. Again, there are *times* when the feminine system requires avoidance of all active and fatiguing exercise, especially on the feet; and, lastly, sitting down on the ice to *cool off,* after being very much warmed up, is an extremely easy way to catch cold. All these mistakes can and ought to be avoided; and then, I repeat, there is no more health-promoting exercise than skating.

Of **swimming,** as an *exercise,* apart from the good obtained from bathing, we cannot speak so favorably. The pressure of the water, and its temperature if cool or cold, force the blood more or less from the surface of the body to the head. Swimming *rapidly* is, also, a *violent* exercise. But every boy and girl should *learn* to swim as early in life as possible, so as to lessen the danger when "overboard" unexpectedly anywhere.

Out-of-door **games,** as tennis, cricket, base-ball, are all, in moderation, not only enjoyable, but wholesome in their effect upon the bodily condition. Exhilaration of mind makes all exercise more beneficial. It is astonishing what an amount of *work* people will do under the name of *play.* A Chinese mandarin, on seeing a number of English gentlemen engaged actively in a game of base-ball or cricket, said, "In my country we always *pay* people for taking so much trouble to amuse us." No treadmill, however, would ever build up muscle like the cricket ground.

Yet such things may be overdone. Cricketers sometimes bring on excessive action of the heart; the most famous one in England, Lillywhite, died a few years ago, under fifty years of age. The strain comes, not in ordinary playing, but in the public *matches,* in which ambition and excitement lead some players to go beyond their strength. So it is in boat-racing. During one of the American contests, Renforth, a splendid oarsman, fainted in his boat, and died a few hours afterwards.



1. Temporalis.
2. Occipital portion of the Occipito-Frontalis.
3. Complexus.
4. Splenius.
5. Masseter.
6. Sterno-Cleido-Mastoideus.
7. Trapezius.
8. Deltoid.
10. Triceps Extensor.
13. Tendinous portion of the Triceps.
14. Anterior Edge of the Triceps.
15. Supinator of Fore-arm.
16. Pronator of Fore-arm.
17. Extensor of the Fingers.
18. Extensor of the Thumb.
19. Extensor Tendons.
20. Insertion of the Triceps.
21. Extensor of Wrist.
23. Extensor of Fingers.
24. Broad Muscle of Back.
25. Its Tendinous Origin.
26. Posterior part of the Obliquus Externus.
27. Gluteus Medius.
28. Gluteus Magnus.
29. Biceps Flexor of the Leg.
30. Semi-Tendinosus.
31. } Double Muscle of the Calf.
32. }
33. Achilles Tendon.

POSTERIOR VIEW OF THE MUSCLES OF THE BODY.

In England, Dr. Morgan, himself once captain of a student crew, wrote a book, called "University Oars," in which he collected answers to inquiries sent to all the Oxford and Cambridge rowing men in forty years, about their health, and the effect upon it of their rowing matches. Of 294 men who had all pulled in more than one race, seventeen, about one in fifteen of them all, reported themselves injured thereby; 162 considered that they were uninjured, and 115 benefited, by their experience with the oars. This proportion of injury, one in fifteen, is quite large enough to strengthen the expectation reasonably founded on the nature of the case, that while **athletic exercises** are, in moderation, useful to health, the strain of **prize athletic contests** is much more **likely to do harm** than good. I believe that it would be wise for college authorities to forbid all intercollegiate contests during term-time.

Tennis is a moderately active game, well suited for both sexes, and pretty safe from doing harm to anybody. **Croquet** is gentler still; quite innocent of bringing on heart-disease, unless in the sentimental sense.

Hunting, except for needed food, is a *barbarous* sport. When one does not break his neck, however, he may probably gain strength through its activity. **Excursions**, for the study of natural science, as geology, mineralogy, botany, ornithology, entomology, or general natural history, become very delightful to those who take them with real intent to see something or get something. The exhilaration of a *purpose* makes such excursions much more bracing to the health than mere "constitutional" walks can be. Those whose pursuits are mainly sedentary, do well to find some object to take them out often to the woods and fields. Hamerton, in his book on the "Intellectual Life," shows how a good degree of bodily activity is compatible with the best kind of intellectual labor. Sir Walter Scott, though lame, rode much on horseback; and he and the poet Wordsworth were both great walkers. Goethe, the German poet, delighted in riding, walking, swimming, and skating. Izaak Walton's fishing-rod is famous; and so, in our time, has been Tyndall's alpenstock; as well as Charles Kingsley's rambles by the seaside, and in the forests of the tropics. Gladstone, after a hard week or two in Parliament, has often recreated himself by cutting down trees at Hawarden; there are probably few better woodsmen than he in England.

Gymnastics, without the pleasant excitement of games, sports, or excursions, nevertheless rapidly increase and develop strength, if rightly managed. The ancient Greeks were very fond of athletic exercises, which they enjoyed thoroughly in their Pythian, Nemean, and Olympic games. The word "gymnastics" comes from the Greek *gumnos*, naked, on account of their often stripping themselves for the strifes of the arena.

Hence *calisthenics* (from *kalos*, beautiful, and *sthenos*, strong) is the better word to use for lighter exercises.

Modern gymnastics are said to have arisen first in Germany, with Guthsmuths of Schnepfenthal (1784) and Pestalozzi. Ling, a poet and scholar, started an institution for physical training, under aid of the government, in Sweden, about 1813; and Captain Rothstein opened one in 1848, in Bavaria. Austria, Denmark, and France, a number of years ago, made gymnastic exercises a regular part of their systems of military education.

Ling, the Swede, is also credited with having introduced the *lighter* gymnastics, or **calisthenics.** In our country, this system was first developed and made popular by Dr. Dio Lewis. It consists of regularly varied successive movements, with light wooden dumb-bells, rods, rings, etc.; no one effort requiring much use of strength. The order of exercises is often planned, like a piece of music or dancing, in detail. It may be timed by an instrument, and performed by a company together, so as to introduce the social element. In this way, some twenty years or so ago, it became quite the fashion in this country, promising almost, for a while, to rival or supersede the dance. It undoubtedly promotes *ease* and *grace*, by the variety of movements, causing symmetrical development of all the muscles of the body. It is very well adapted to girls, and may, with great advantage, be made a part of the daily *régime* of schools.

Without looking back to Samson, Hercules, or even Thomas Topham (who could pull against a team of horses), we may notice a few of the more recent feats of strength, as *maxima*.

Dr. Parkes, in his work on Hygiene, mentions a workman in a copper-rolling mill, whose day's labor sometimes amounted to 723 *foot-tons;* that is, raising 723 tons one foot, or a ton 723 feet, in the course of the day. 400 foot-tons would be a *hard* day's work for most men; 300 foot-tons a fair average performance. In India, eight palanquin-bearers carried a weight of 200 pounds twenty-five miles in a day, equal to 600 foot-tons for each man. Many palanquin-bearers will run with a weight up an ascent ten miles a day, equal to raising 500 tons one foot. In walking without a weight, on a level, a man may be estimated to raise $\frac{1}{20}$ of his weight to a height equal to the distance walked. In ascending, he lifts his whole weight to the height of the ascent. A walk of ten miles on a level is about equal to raising 200 foot-tons.

Walking 1000 miles in 1000 hours, at first thought, may seem easy enough. But it is far otherwise, because of the short time obtainable for intervals of *rest*. It has, however, often been done. More remarkable are the performances of Weston, Rowell, and two or three others,

within a few years—going more than 100 miles within twenty-four hours, and even over 600 miles in six days.* This is an unnatural strain, of course; it is not likely that either of them will live long.

Marching, with a soldier's accoutrements, is much more fatiguing than ordinary walking. Twelve miles a day are counted by authorities as enough for an average for troops. But, even in the hot climate of India, in 1809, three British regiments marched sixty-two miles in twenty-six hours, each man carrying from fifty to sixty pounds' weight. They lost only seventeen stragglers. A regiment of the same army (the Fifty-second foot), in 1857, marched forty-two miles in twenty hours, partly in the sun; and the next morning marched ten miles farther, then engaging the enemy in battle. Two English companies, in India, once marched 195 miles in nine days—over twenty-one miles a day.

Captain Webb's swimming exploits have been very notable, especially his crossing the British Channel, from Dover to Calais, in about twenty-one hours. The distance cannot have been less, and probably was more, than twenty miles, as he made it. His fatal attempt to swim through the whirlpool below Niagara Falls, showed that he lacked in judgment as much as he excelled in strength.

Turkish porters are famous for their lifting and carrying powers. One of them has been often known to carry 600 to 800 pounds at a time—of course, not very far at once.

Mention has already been made of the great strength of Dr. Winship, of Boston. By a simple apparatus which gave him opportunity to use all his muscular ability at once, he succeeded in lifting about a ton—2240 pounds. I saw him put up a 180-pound dumb-bell, far above his head, with no more apparent difficulty than most men would have in raising one weighing thirty pounds. Yet his figure was not comparatively large; his weight, I should suppose, about 180 pounds.

Such feats surprise us in men. But how far they are transcended by some lower animals! A canary bird in its cage, without use of its wings, will leap to its perch with ease, twice or more its own height. A flea will leap more than two hundred times its own length; and the obscure *tumble-bug* will roll a load exceeding many times its own weight.

Very strong men are sometimes said to be stupid. There can be no necessity for this. But muscular development promotes a quiet state of the nervous system; and there *may* be such a thing as a *disproportionate* cultivation of the muscles, somewhat robbing the brain and other parts

* Fitzgerald, in New York, May, 1884, walked (or ran) 610 miles in six days; Rowell, in the same contest, 602 miles in the same time. It is instructive that Rowell will drink *nothing but water* during his pedestrian feats, being sure that alcoholic potations would impair his endurance of fatigue.

of their full share of vigor. *Balance*, symmetry, is what is wanted for ideal health; "*mens sana in corpore sano;*"—a sound mind in a sound body;—with no excess or deficiency anywhere. A very important advantage of active daily exercise (always best in the open air) from early life, is, that it so promotes the circulation of the blood, quickens the breathing, favors the escape of perspiration and of other secretions, as to do much towards the maintenance of the *general health*. Indeed, it is very difficult to keep good health without exercise. *Sedentary* employments are, as a rule, the least healthful. Those whose business does not take them out of doors, should go out *on purpose*, day or evening, for as long a time every day as they can get for it. As a last resort, if nothing else can be done, the use of dumb-bells will prevent actual stagnation of blood in the muscular system.

As to *work*, certain kinds are more favorable than others to health. Worst, are those in which a stooping position is required. Best of all, when *variety* of muscular action is in place, without any one effort being severe, or the whole labor prolonged too much. Women cannot, as a rule, do nearly so much as men; and children should *never* be put to severe task-work. Laws limiting this are necessary, and exist now in several civilized countries. They are, however, not sufficiently enforced, even in the United States.

Sewing-machine work has been charged with being injurious to the health. I believe this to be a mistake. Some observation and inquiry among those who use the sewing-machine have given me the conviction that sewing with it is *less tiresome*, hour by hour, than *sewing by hand;* and a great deal less so than running up and down stairs, or even *standing all day;* as shop-girls nearly all formerly had to, and some still (very wrongly) are compelled to do. Tom Hood's "Song of the Shirt" was, and could have been only, written before the sewing-machine was invented.

ONE DAY'S REST IN SEVEN.

Christendom has changed the order of its week from that which, among the Jews, made the seventh day to be its Sabbath. But the institution of a weekly rest is older than Moses; and it has its justification in man's nature. Several nations remote from Palestine have had such a custom from a very ancient period. The experience of civilized nations establishes the physiological need of it. In the time of Robespierre, the French Revolutionists substituted one day's rest from

ordinary occupations in every ten days. But they soon found it did not work well; and religious influences were not waited for to return to the old order. It is true that a European "Sunday" is not a time of general cessation from occupation. Many people, especially those contributing to public amusements, are then very busy. But even with these, and with the majority, there is a *change* of work, or from work to play; and so far as this falls short of real rest, it is a loss to the best advantage of the population.*

Sir Robert Peel, many years ago, gave his experience and observation as a public man to the effect that no one can work seven days in every week without prematurely breaking down. William E. Gladstone, in 1875, made a public declaration of his conviction of the *need* of the weekly day of rest. Abundant evidence of this exists; we may lay it down as almost an axiom in Hygiene, that every man, woman, and child (and every working *horse* and *ox*, also) requires for health the cessation, for one day in seven, of the occupation pursued during the other days of the week. This is true of *brain*-work as well as muscle-work; of *study* as well as of labor.

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* In the *programme électoral* of the French Workingmen's Party, in 1883, while the suppression of State support to religion is called for, one requirement is, of *repose for one day in seven*, enforced upon employers by law. About the same time, efforts of the same kind were made in Milan and Genoa, and by the Mutual Help Shopmen's Society of London. Even in Germany, a growing demand for the day of rest has been recognized among the working classes.

SEXUAL HYGIENE.

Of the organic structures of animals and human beings, some, but not all, portions are essential in their action to life itself. This is the case with the lungs, because we must breathe; with the heart, since the blood must be made to move around in its course; and so with the stomach to appropriate food, the kidneys and bowels to excrete waste material, etc. But other organs, as even the brain, are not indispensable to life. A bird may have its brain sliced away, and yet live for a considerable time if it be fed and looked after.

It is especially true of all that belongs to the reproductive system, that its activity is not necessary to the individual life. Its purpose is the continuance of the species; apart from that, it may remain virtually inert. Thus the mammary glands in women, while they are unmarried, may be quite inactive through a long lifetime. Should marriage and parentage occur, their service is called out by a spontaneous natural process (most admirable in design and effect) for the nourishment of offspring. It is true that a periodical formation, accumulation, and discharge occurs in and from the female system (*ovaries* and *uterus*) regularly, while in health. But this is provisional only, and not a part of sexual activity, properly so called.

Being then not *necessary* to the individual, is reproductive activity favorable or unfavorable to health? We answer, it is only favorable under *normal conditions*. Let us here state some leading principles on this subject, and comment on them afterwards.

1. Action of the reproductive system is (as just stated) not needful for the life or health of the individual.

2. No harm results from the absence of reproduction, or of activity of its apparatus, through life.

3. Such activity is healthy and safe only in marriage.

4. The married state appears from experience to be, as a rule, more favorable to health of mind and body than that of celibacy.

5. Abnormal sexuality is injurious in proportion to *a*, prematurity; *b*, deviation from naturalness; *c*, frequency and amount of excess.

6. Such errors or excesses may produce great injury to health; not rarely causing *epilepsy*, *disease of the heart*, *insanity*, or *general nervous debility*.

7. Chastity of life requires *purity of thought and feeling*.

Nothing is more clear in regard to design in nature than that sexual relations are providentially adapted to increase happiness upon the earth. They exemplify the highest kind of natural *polarity*. By this we mean

the *attraction* of *opposites,* which at the same time have *more* of *likeness* than of unlikeness in their nature. Thus the North pole of one magnet attracts the South pole of another; both are magnetic, but oppositely so. Anything electrified by rubbing glass attracts whatever is excited by rubbing with sealing-wax; one is called a manifestation of *positive,* and the other of *negative,* electricity. We call by the name of *chemical affinity,* that attraction by which, for example, phosphorus unites with oxygen, bursting into flame as they combine rapidly. Likewise, even iron filings dropped into a jar of pure oxygen will catch fire, in a sort of "passionate" union.

All through living nature we find sex to be present and dominant. Sometimes, in plants and certain of the lower tribes of animals, male and female are both upon the same organism. But in the higher ranks of plants generally, and in all the higher orders of animals, fertilization is effected by two individuals. Darwin makes great account of "sexual selection" in the animal kingdom; believing that the choice, by those of one sex, of such of the other as have superior qualities, tends to perpetuate these, and so to elevate the species.

Love is the word by which we express the attraction of one *person* for another. While the highest kind of love, that which is Divine, is not sexual, that which is next below this in grade finds its completest type in marriage. Here (when well assorted) is seen the union of all that attracts, through the "congeniality" of race-likeness, with the sex-oppositeness which accords with the great law of *polar affinities* in nature.

Yet, like many other of the best gifts in man's possession, this endowment of sexuality has been very often so perverted as to become the source of much evil; of many disasters. Both history and fable teem with such results. It was by a woman that was shorn the strength of Samson the strong, and by women was overcome the wisdom of Solomon the wise. A woman bred the great Homeric war of the siege of Troy, and many a royal and state trouble since. Every man finds himself called upon to watch against dangers connected with his passions in the world; and if he leaves the world, as many an anchorite has done, he may find that thus he has only narrowed, not avoided, the field of conflict; which, from Origen and Jerome to Abelard and since, is unavoidable. Every one, herein, must learn to be his own master. Society, in this, by its code of opinions, aids women more than men; and so far, men lose, on the whole, some advantage, both in the realm of hygiene and in that of morals.

When sexuality is abused, no function is capable of greater injury to health. Reproduction is, of all the *organic* functions (see **Physiology**), the highest; being almost the *creation* of a new being. This requires

elaborate preparation. In those insects, for example, which have three stages of life, those of the *larva*, *pupa*, and *imago*, the duration of the last is the shortest; but in that alone can they reproduce; that is the culmination of their existence.

Thus no error of life is so destructive (except, perhaps, that kind of *poisoning* called *intemperance*) as sexual immorality and excess. On this, further remarks must be here made.

Prematurity increases the injury of sexual indulgence very much. A man is not fully fitted for marriage before the age of twenty-one, or better, twenty-five; a woman, not usually before twenty years at least. Marriages very often, of course, occur much earlier. In Eastern countries, girls are commonly married at fifteen, fourteen, thirteen years; sometimes younger still; but the result of this is, deterioration of families and of races under it.

Sexuality, again, is safe or the reverse according to its *naturalness*. With a true and complete union as in marriage, combining permanent and elevating affection with passion or desire, it is normal; although here also indulgence is capable of excess. But as sexuality or sensuality deviates from nature into a mere passionless self-gratification, it becomes, in the same degree, more deleterious in its effects. Ruinous injury to health may thus follow; involving the *heart*, *brain*, and *nervous system* generally, often with great general debility. Cases illustrating this are seen in most hospitals, almshouses, and hospitals for the insane. Moreover, the special diseases attendant upon irregular sexual life (of which *syphilis* is the worst) constitute a form of penalty terrible enough, when known, to deter any one having a spark of prudence, from risking their dangers. Under a single exposure, a healthy constitution may become involved for life; and not only that, but his *offspring*, too, may be tainted, even fatally, from their birth.

There is no hygienic justification for what is called in England "the great social evil." To extend governmental protection to this in the form of license is a wrong not only against morality, but against sound principles of public health. Experience (attested, for example, by M. Lecour, who was for a long time chief of the "Bureau des Mœurs" of Paris) proves that it does not prevent, nor even lessen, the amount of disease which it professes to antagonize. "Contagious Diseases Acts" were passed a number of years ago in England; but very wisely, in 1883, they were practically annulled. The remedy for the great social evil and its consequences must be *moral* and *educational;* not that of force, *espionage*, or law. *Early marriages*, favored by social customs, and especially by young married people being allowed to live moderately in style and expense, so as not to have to wait half a life-

time before their union, may do much for social morality, health, and happiness.

We have already said that individual life and health *do not need* reproductive activity; and yet that the married state is, as a rule, the most favorable to health. How is this seeming contradiction reconciled?

In the first place, all know that, through the infirmity of human nature, sexuality is not nearly always confined to the state of marriage; and then its irregularity does harm in various ways. Moreover, the affectional relations of marriage, with the common aims, cares, and ties of *family life*, are mentally and morally, indeed in every way, wholesome for men and women.

Children are like "arrows in the quiver" of a married pair. Let no married person wish, much less endeavor, to be without them. Mischief of most serious kinds has thus been wrought, under wrong and mistaken ideas, in many households, especially in this country. No right-minded person should dare thus to tamper with the ordinance of nature to "increase and multiply."* On the other hand, a man may tyrannize over a wife so far as to make her the *victim* of incessant childbearing, beyond what her strength and health can endure. This is inhuman altogether. The true ideal of marriage is that each should be a considerate "helpmeet" to the other.

About the real salubrity of the married condition, many facts might be cited. Amongst others, Dr. Bertillon, of France, collected statistics, which showed that, in various European countries, "a bachelor of twenty-five is not a better life than a married man of forty-five. Among widowers of from twenty-five to thirty the rate of mortality is as great as among married men of from fifty-five to sixty." In France, the rate of mortality among married men between twenty and twenty-five years of age is ten per thousand; among bachelors of that age, sixteen per thousand; and among widowers, nineteen per thousand. Dr. Stark, of Edinburgh, has proved that in Scotland, during nine years, the death-rate of single men between twenty-five and thirty years of age was double that of married men of the same age. Between fifteen and thirty years, married women have a greater death-rate, on the average, than single women; after that age, a longer expectation of life. In a perfectly well-regulated state of society this difference would almost certainly not be so great; but the facts are interesting and instructive.

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* In the year 1865, there were 200,000 married couples in New York State *without children.*

It ought always to be remembered that the true relations between the sexes have quite other and higher importance than that which is merely organic. This may be seen in contemplating the ties of brotherhood and sisterhood, and those between father and daughter, mother and son; and also those of mutual trust and benevolence, brought out by the circumstances of war or other calamities—of which, in our age, Florence Nightingale has been the typical representative.

> "O woman, in our hours of ease
> Uncertain, coy, and hard to please;
> When pain and anguish wring the brow,
> A ministering angel thou!"

One of the highest tests of civilization among individuals and nations is the respect shown towards women, and the right valuation of a true and pure womanhood.

Upon these views we should be far from discouraging the frequent social and friendly intermingling of the sexes. The more constantly they mingle, of course with proper guards and influences, from early life, the less will be the tendency to *morbid sexuality;* much of which springs from a combination of imperfect principle with injudicious constraint. That which is forbidden is apt, in our human nature, to be most craved as well as most misapprehended. If, then, boys and girls, young men and women, were allowed to mingle frequently as playmates, schoolmates, companions, and friends, while some of the sentimentality, romance, and exaggeration, which so often overcloud the relations of the sexes, would be dispelled, a more safe and substantially useful, and altogether a happier, sense of fellowship would be established.

For such reasons, **coeducation** may be expected to be more favorable to the physical, mental, and moral health of both sexes, than the monastery and nunnery-like method of isolation during school and college days, which has until latterly so much prevailed. Within the last twenty-five or thirty years, so many institutions, from kindergartens up to universities, have tried the experiment, with uniform success, that it may now be confidently said that coeducation will be *the* method of education in the next century, if not in the next generation. It unsexes nobody; it tends to make men more manly and women more womanly. Those who, on theory, object to it (no one does so who has seen it fairly tried), forget the great difference between the case of Paul and Virginia, alone together on an island, and that of a dozen, a score, or a hundred Pauls and Virginias, in the school-room, lecture-room, or even on the cricket-ground, or in a debating society, together. As to

morbid sexuality, the case is somewhat like that of certain electrical arrangements. How can you get up the most extreme electrical excitement? By putting, as in the Leyden jar, two coats of metal, on opposite sides of a thin separating glass, and then charging them. A great shock comes when they are suddenly brought into communication. But if the same charge of electricity were put into a *row* of metal plates, already in communication with each other, it would be harmlessly diffused.

Here comes in, however, an important qualifying thought. The social principle, natural and wholesome as it is, may be abused. Under the above allusion to Paul and Virginia, some of this kind of danger may be recalled. Readers of that beautiful romance may remember how the sweet girl's heart grew troubled in its fondness, just before Paul was sent away. Sexual excitement, aroused and heightened by too familiar contact, becomes perilous. If, under unrestrained impulse, with opportunity, it be yielded to, one or two lives may be socially and morally ruined. If, on the contrary, it be encouraged without satisfaction, it is always more or less, sometimes very decidedly, injurious to health. Hence the waltz and the German, witnessing the ballet, and all other provocatives of strong sexual feeling in the unmarried, ought to be condemned, on *hygienic* grounds, over and above what moralists have to say about them. So, also, *long engagements*, sometimes encouraged for economical reasons, are far from beneficial. When once betrothed, it is better for marriage to follow as soon as prudence and circumstances will at all allow.

We may venture also the suggestion, that our idea of "American liberty" has gone now pretty far, in regard to some social usages. Nobody will ever want to get back, in Europe or in this country, to the customs of the Hindoo *zenana* or the Moslem *harem*, where women, young and old, are kept in slavish seclusion from men. But there was something real in the experience which long ago suggested, in the care of young people, the value of the "duenna" and the "chaperon." Pairing, or "arking," at our summer resorts and elsewhere, has been well satirized by humorous writers, such as Robert Grant.* It is not altogether impossible that less amusing occurrences may, sometime, show that, even in America, liberty may be safer, and thus happier, under prudent limitations.

* Author of the "Little Tin Gods on Wheels," etc.

HYGIENE OF GIRLHOOD.

About fifteen years of age (earlier in tropical countries) is the period of transition from childhood to adolescence, commonly called puberty. A great change is then effected, not suddenly, but by a development, in which the apparatus is perfected through which maternity is made possible. So regular, according to the natural law of organic economy, is its subsequent periodicity, that its interruption or disturbance may seriously affect the health.

As Dr. Mary Putnam-Jacobi has shown in a very able treatise, the crisis in the system belonging to the monthly process begins a day or two or more *before* the flow, which is really its last event. Girls require more special care than grown women, in respect to the full establishment of *regularity*. The crisis ought to occur once in four weeks, to the age of forty-nine or sometimes later; interrupted, in the married, only during the months of pregnancy, and for a few months after its completion.

Opinions and statements have differed, even amongst those who might be supposed to know, as to the amount of *disability* connected, in healthy girls and women, with the monthly crisis. On the general principles of Physiology, we should not expect any disability at all to belong to it. Several physicians of repute, however, assert that even healthy women are, at such times, altogether *invalided;* unfit for bodily or mental exertion. Dr. D. H. Storer, of Boston, has mentioned this as a reason against women undertaking to practise medicine; because, for about one week in every four, they have to be patients themselves. The late learned Dr. Clarke, of Boston, published a book on "Sex in Education" (which did, in my judgment, a great deal of harm), in which he asserted that the whole business of the education of girls and women must be conducted in view of this one-quarter-invalid life of the sex. But these gentlemen have, as practitioners of medicine, seen most familiarly, the *invalid side* of the subject. Many women, and some girls, are not healthy; and, in them, this periodical function is often prominently disturbed. This does not, however, determine the *law of health* concerning womanhood.

Several able answers to Dr. Clarke's book have been written and published. It will suffice for our present purpose to quote the words of Dr. Elizabeth Garret Anderson, of London; one of the first medical women of England. She says: * "It is, we are convinced, a great exag-

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* *Contemporary Review*, May, 1874. Anna C. Brackett, amongst others, has expressed the same judgment, in her book on "Education of American Girls."

geration to imply that women of average health are periodically incapacitated from serious work by the facts of their organization."

Accepting this as the truth, confirmed by my own opportunities of observation, I must add, that the examples of those whose health is *below the average* are not few in number. Some women, and more girls between fourteen and eighteen years of age, *are* decidedly invalided every month; and a much greater number require *great caution in self-management* at such times. Indeed, *all* women need to be particularly careful of themselves *just before* and *during* the menstrual crisis.

The things to be especially avoided then are, 1. *Exposure to cold and wet;* 2. *Fatigue,* especially long standing or exercise upon the feet, or on horseback; 3. *Mental strain,* or much mental excitement. By the first of these causes, the flow may be arrested, and subsequent irregularity brought on; or pain and illness may result at the time. By the second, the occurrence of excessive hemorrhage may be endangered; or congestion (overfulness of blood) of the uterus may take place instead, often having secondary consequences of various kinds. The third cause, mental strain or excitement, in some constitutions, puts off or interrupts the normal flow, or gives rise to painful attacks (dysmenorrhœa), from the nervous connection and sympathy between the brain and the ovary and uterus.

On the whole, it is probable that sedentary and luxurious, rather than active and laborious, habits, are the most likely to promote irregularities and uterine sufferings in women. These do not so often appear, for example, amongst domestic servants as amongst their mistresses; the kitchen and the laundry try the system less than the parlor and the ball-room. A young lady who, rather than miss an occasion of enjoyment, will, at a time when she should be quiet, dance nearly all night, may be expected, next time, to have to lie still, whether she will or no. Almost the worst of all, however, is the morbid life of which the most active exercise is the occasional drive in a carriage; the *sofa* and the *novel* characterizing the hours mostly spent within doors. Along with uterine troubles, giving large occupation to professional specialists (gynæcologists), these are nearly sure to be affected with *neurasthenia;* a term brought into use by an American physician to apply to the myriad-formed *nervous debility,* which some foreigners have latterly called "the American disease."

PREGNANCY: GESTATION.

By this (derived from a Latin word meaning *to carry*) is meant the period during which offspring is undergoing development in the uterus. Its first signs are, the non-appearance of menstruation at the usual time, and the "morning-sickness," which is sufficiently described by that term. In the fourth month, perhaps at its beginning, comes *quickening; i. e.* the felt movement of the animated being within the maternal frame. About 270 to 280 days are occupied by the whole process of healthy gestation; the last-named period is probably nearest to the average of its duration.

Much care is needful at this time, especially in delicate women, and most of all when it occurs for the *first time*, lest miscarriage be brought on; this being an occasion not only of disappointment, but of danger. Bodily fatigues or shocks, and mental disturbances, are the most likely causes of such a result.

It is quite important for a woman in this condition to have the *bowels regular*. Active purgative medicines should not be used, nor any, except when necessary. When constipation occurs, simple rhubarb pills will generally do; or, if not, a teaspoonful dose of flowers of sulphur, in syrup, or (especially if the *kidneys* do not act well, as shown by a free flow of water) with a teaspoonful of cream of tartar, mixed together in molasses or fruit-syrup. Such a dose at night, once, twice, or thrice a week, will generally be enough. If not so, medical advice had better be obtained. The full-blooded state called *plethora* sometimes occurs during pregnancy, and more important still is the interference of the pressure of the enlarging uterus with the circulation of blood, affecting the kidneys, and sometimes endangering *convulsions*. These are very serious.

Mental tranquillity is very desirable during gestation, for the sake of both mother and offspring. Among the conflicting accounts and probabilities, it is rather difficult to decide whether *marks* really occur on children, in consequence of their mothers having seen striking or startling things. While such are more likely to be *coincidences* only, we cannot say that such effects of strong mental impression are entirely impossible. And it is certain that a fright or strong agitation of mind during pregnancy may produce abortion; or, without that, may so impair the nourishing power of the parent that the child may have its development interfered with, and, if not a monster, or stillborn, it may be at the best but a weakling. Therefore much pains should be taken to promote the serenity of mind, as well as health and comfort of the body

of the mother, during this period. *Hard labor* is very unsuitable for pregnant women. Almost as bad is leaving the bed and going to work *too soon after delivery*. Many working women are thus injured, and the lives of their children shortened, by their mothers not being able to furnish them with sufficient nourishment in early infancy. The example of the generous French manufacturer, M. Dolfus, was an excellent one. He paid every married woman in his service, when brought to bed, six weeks' wages, *without requiring any work for it.*

MOTHER AND INFANT.

Parisian women have long had, whether they deserve it or not, the undesirable reputation of putting off the care and nutrition of their infants upon hired nurses, to a larger extent than is done anywhere out of France. It is said that ladies of wealth and fashion often send their babies away from home, in charge of such nurses. This kind of "baby-farming" is very unproductive of healthy life. *The natural law of maternity includes the nursing of every child by its own mother.* Unless her supply of breast-milk fails, or her deficient general health and strength unfit her for it, this should be regarded as a sacred duty, as well as a source of happiness. Next best, when this is impracticable, is the service, near the mother, of a healthy wet-nurse. Last, is the resort to the "bottle," feeding by hand, of which more will be said in another place in this book. Under such customs as that above mentioned, the natural increase of population in France is reported to be less annually than in any other civilized country in the world.

Our own country has increased wonderfully in population, which has, several times, doubled itself in twenty-five years. Immigration from Europe has had a large share in this. Apart from that, it is by no means certain that our numbers would now increase very fast. Dr. N. Allen, of Lowell, Mass., has shown by statistics that the number of children born of *foreigners* resident in Massachusetts is decidedly greater than in *native American* families. It is not easy to make sure of the explanation of such facts; but they seem to show that something is wrong with our people. Climate may have to do with it; but we may fear that our life is, also, too artificial; too far from healthy nature; with not enough escape from money-getting on the part of men, and from social ambition and house-slavery, or society-servitude, with women. At all events, let us look around carefully, and try to discover the cause of this apparently growing anomaly; and correct it, if possible.

WHO SHOULD NOT MARRY.

Consumptive persons ought not to become engaged to be married; not only because of the probable shortness of their lives, but because a tendency to consumptive disease is often transmitted to children. A man who has constitutional *syphilitic* disease ought never to think of marriage, unless after obtaining good evidence that he has been permanently cured. *Insanity,* while it lasts, of course disqualifies any one from marrying; and it is a great personal risk to marry one who has ever had an attack of lunacy. Certain *families* are known to inherit a marked predisposition to insanity. Marrying into such families is imprudent. *Intemperance* ought to be considered, more positively than it generally is, a clear disqualification for marriage. Every one knows that a woman joined to a drunken husband is, usually, the most wretched of slaves; but not many appreciate the effect of intemperance upon *offspring.* Here is an instance of this: Dr. Hills, of Columbus Hospital for the Insane, Ohio, reported the case of a man who in the first part of his married life was temperate, and had four children, perfectly sound and healthy. He then grew intemperate, and continued so for several years, during which he had four more children. Of these, two became insane, another idiotic, and the fourth epileptic. Then he reformed entirely, and afterwards had three more children, all of whom were entirely healthy.

Of diseases which do not render marriage impossible, and yet should, in prudence, forbid it, *epilepsy,* also, may be mentioned. It is very apt to be inherited; and subjection to epileptic fits is a terrible misfortune to an individual and to his family.

In regard to all these matters, the time to give or receive counsel is *before* the entanglement of the affections. After strong attachment has already been formed, it may be a very serious question whether the harm done to the individuals by disappointed affections may not outweigh all other prudential considerations, and make their marriage the least of probable evils. Even death-bed marriages are sometimes right, for special, exceptional reasons.

Near relations have been forbidden marrying with each other, from the time of the Mosaic dispensation down to our own. In ancient Egypt, for several generations, the Ptolemies married their own sisters; the celebrated and beautiful queen Cleopatra was the descendant of such a union, and the wife of her brother. But the common sense of mankind almost everywhere has outlawed such marriages.

Practically, the only question in modern times has been, concerning

the marriage of first and second *cousins.* Until within a comparatively short period, it was held to be an undoubted principle, that all union of those nearly related, being against nature, must, for that reason alone, cause enfeeblement of offspring and family degeneration. Facts of a somewhat striking kind have been brought forward to support this view. Boudin, in France, ascertained that from 25 to 30 per cent. of all deaf-mutes were born of parents nearly related; while parents, themselves deaf-mutes, are not particularly likely to transmit that defect to their children. Devay found in the children of 121 consanguineous marriages, 27 deformed and 2 deaf-mutes. Boinet reported 5 idiots in 5 such families. Dr. Howe, in New England, gathered statistics of 17 marriages of relations. Of these, 95 children were born; of whom 44 were idiots, 12 scrofulous and delicate, 1 a deaf-mute, and 1 a dwarf. Dr. Bemis, of Kentucky, collected the results of 833 consanguineous marriages, having 3942 children. Of these 145 were deaf-mutes, 85 were blind, 308 idiotic, 38 insane, 60 epileptic, 300 scrofulous, 98 deformed, and 100 others defective in one way or another.

This is a very ugly-looking record. We are not told, however, what were the circumstances *otherwise* of these marriages; whether or not other causes might have contributed to explain such deteriorations.

On the other side, also, a good deal has been urged. Périer and Voisin in France, Buckle, Child, an anonymous writer in the *Westminster Review* (1863), and George H. Darwin, in England, have argued quite ably upon it. They recall the accepted history of the human race, as originating from a single pair, whose children had no choice of mates but among themselves. Besides Abraham and Sarah (half-brother and sister), and the Ptolemies, also, we are pointed to the kingdoms below us, of animals and plants, for examples of close interunion. Many plants, and not a few of the lower animals, are *hermaphrodites;* that is, have both sexes upon one individual. It is true that, even with these, C. R. Darwin concluded that "Nature abhors self-fertilization." But with pigeons, in the domestic state, close breeding is the rule rather than the exception. Thoroughbred race-horses are often *very* close bred. I give in a note* a remarkable example of this.

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* The following is from the New York *Herald*, December 23, 1874: "The filly, Lady Stout, three years old last spring, which won the second, third, and fourth heats in the stake for colts and fillies of that age, at Lexington, in 2.30¼, 2.29, and 2.32½, was bred by John Stout, of Woodford county, Kentucky, is by Herr's Mambrino Patchen (own brother of the great Lady Thorn), by Mambrino Chief, dam by Gano (son of American Eclipse, he by Duroc, son of imported Diomed, dam Betsey Richards, by Sir Archy, by imported Diomed, the winner of the first English Derby, in 1780); second dam by

In the vegetable world, a nearly parallel instance of this is in what is called "pedigree wheat."

But in all these cases, while the stock is continued, and notable qualities seem to be perpetuated, it does not follow that there is not, after all, a tendency to degeneration. Youatt, the great authority concerning dogs and horses, says that, in the latter, "strict confinement to one breed, however valuable and perfect, produces gradual deterioration." Sir John Sebright, another observer of large experience, writes thus of in-and-in breeding: "I have no doubt that by this practice being continued, animals would in course of time degenerate to such a degree as to become incapable of breeding at all." Race-horses are, in a manner, equine monstrosities. Their speed is wonderful; but it is acquired at the expense of many other traits which go to make up the perfect, original, ideal horse.

In this *exaggeration of family peculiarities* we may see what is most important upon the practical question in human society. Few families are absolutely free from tendencies to disease of some kind. When, then, cousins (especially first cousins) marry, these morbid tendencies are almost sure to be doubly strong in their children. In communities shut up for centuries in the narrow valleys of Switzerland, and in some other mountainous countries, intermarriages are common; all the people are more or less nearly related to each other. It is exceedingly probable that this is *one* (though not the only one) of the causes of the extensive prevalence there of the deforming *goitre* of the throat, and the stunting and semi-idiotic *cretinism*.*

We are justified in the conclusion, that there is a law of sexual opposition in nature, according to which those most nearly related, or otherwise organically alike, are not the *best* adapted for marriage, and are

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a son of Sir William of Transport, he by Sir Archy, out of Transport, he by Virginius, son of imported Diomed, out of Rhea, by Chatham, Lady Stout's dam, Puss Prail, by Mark Time, he by Bethune, son of Sadi Hamet, by Virginia, son of Sir Archy, by imported Diomed; second dam by Webster, he by Medoc, son of American Eclipse, by Duroc, by imported Diomed. There are no less than seven direct crosses to imported Diomed, and three direct to imported Messenger. This pedigree is not extended as far as it could be, but it is sufficient to show that an admixture of thoroughbred blood not only does not destroy trotting action, but adds to it, and gives that most important and most vital quality, the ability to trot heats fast and repeat them. This filly, in three days after her race, was given a public trial in the presence of a large assemblage on the same course in 2.30¼, 2.28¾, 2.28. The latter performance stamped Lady Stout the fastest and best three-year old in the world."

* Yet Voisin, in 1865, reported that at Batz, on a small peninsula near the mouth of the Loire River, in France, with a population of 3300 people, and almost no newcomers from year to year, there were no examples of physical deterioration: no blindness, deaf-mutism, epilepsy, idiocy, nor cretinism.

not so likely to have healthy and vigorous offspring as others. Between the *blond* (fair complexion, light hair, blue eyes) and the *brunette* (dark hair and skin, black eyes) there is naturally more *affinity* than between those who are both fair, or both dark; and so with other personal or family characteristics. While, then, it cannot be dogmatically asserted that the marriage of near relations must always end in deterioration of offspring, we may be sure that any morbid tendency of their common ancestry will be likely to be in them intensified; and since (as above said) scarcely any family is faultless in constitution, this alone is sufficient to *condemn such marriages* on grounds of health. It would be a gain to society if the marriage of *first cousins* should be forbidden by law; and that of second cousins ought to be discouraged. Farther than that we need not go.

MENTAL HYGIENE.

Health, of body or of mind, is **wholeness**; soundness; therefore strength as well as freedom from disease; fulness of life and power for action.

We do not need here to consider abstractly the *theory* of mind. Man is distinguished above the brutes not so much by his bodily structure as by his mental superiority. The higher animals have faculties in many respects much like ours. The dog, horse, elephant, and monkey, nay, even the ant and the bee, **think** and **feel**; and these are attributes of mind. But our capacities of thought, reason, and imagination, are much higher than theirs; and our emotional nature includes what theirs lacks, the obligation of **conscience**, and the upspringing of **worship**. These belong to that which is distinctively not animal, but human, and kindred to the divine; our **spiritual** nature.*

As we are in this world, however, **brain** being the **organ** of all mental capacity, it may be safely said that *as the brain is, so is the mind.* This view of the subject suffices for the purposes of *Mental Hygiene.*

Mental health and power are affected by several positive influences, which may be named as follows:

1. Inheritance.
2. Age.
3. Sex.
4. Material agencies and bodily conditions; as
    - *a.* General health.
    - *b.* Atmosphere.
    - *c.* Food and Drink.
    - *d.* Exercise.
    - *e.* Sleep.
5. Mental Influences; as
    - *a.* Civilization.
    - *b.* Education.
    - *c.* Intellectual labor.
    - *d.* Mental excitement, or the reverse.
    - *e.* Sympathy.

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* In the Bible, three words are used in describing the being of man; *soma, psuche,* and *pneuma;* nearly corresponding with *body, mind,* and *spirit.*

HEREDITARY TRANSMISSION.

Inherited organization is much, but far from all. Everybody knows what "family likeness" is; not only in faces and figures, but in *characters.* On the largest scale, we see mental as well as bodily characters in *races;* all inherited, with gradual modification, through long periods. John Bull and Brother Jonathan are real types. Frenchmen are animated and changeable; Germans slow and grave; Italians passionate; the American Indian seldom is either merry or tearful; the Negro, almost always one or the other. Like father, like son; mothers and daughters are often images of each other. Strange qualities, odd or desperate, crop out from one generation to another; the worst (except a hereditary tendency to crime*) is a melancholy form of insanity, tending to suicide. The great Doctor Johnson spoke of his having inherited a touch of mental malady from his mother. Wise man as he was, he never could enter a room with his left foot foremost, or pass a lamp-post without touching it with his cane. If he missed one, he had to go back and hit it. Lord Byron inherited a morbid temper from both father and mother. The gentle poet Cowper struggled with insanity all his life, twice attempting suicide. Alexander Cruden, author of the Concordance, was half mad very often; enough so to persecute, in the most annoying way, respectable ladies who refused his offers of matrimony.

Rarest of all is the inheritance of extraordinary *genius.* *Talent* of high degree is often transmitted. So, there have been two Pitts, two Foxes, two Herschels, three Coleridges, and several distinguished Sheridans, Kembles, Adamses, and Beechers.† But there have not been two Platos in philosophy, two Raphaels in art, two Miltons or Shakspeares in poetry, two Newtons in science, or two Cromwells in successful government. It is true, the *mothers* of great men have often been superior women, and their fathers may have possessed abilities whose outcome was not favored by circumstances. But *genius* (notwithstanding Galton's having written an able book on "Hereditary Genius") seldom appears more than once in the same family.

* See Dugdale's History of the Jukes Family.

† Dr. Elam observes that there have been also two Scaligers and two Montesquieus, and calls attention to the facts that there were eight Greek poets of the family of Æschylus the tragedian; that the father of Tasso was a poet; Flaxman's father was a plaster-moulder; Thorwaldsen's a sculptor; Raphael's a painter; Vandyke's, Titian's, and Vernet's families had other painters besides themselves; Mozart's father was a violinist, Beethoven's a tenor singer, and Bach has been the name of a number of musical composers.

AGE.

Instinctive childhood, *impulsive* youth, *reasoning* manhood, and *judging* old age—lapsing, when much prolonged, into second childishness—this is the natural order of mental life. Such stages succeed each other as regularly as green bitterness, sourness, and ripened sweetness, followed by decay, in fruit. Shakspeare has fully set forth this progress in his "Seven Ages":

> "At first, the infant,
> Mewling and puking in the nurse's arms:
> And then the whining schoolboy, with his satchel,
> And shining morning face, creeping like snail
> Unwillingly to school: And then, the lover;
> Sighing like furnace, with a woful ballad
> Writ to his mistress' eyebrow: Then, a soldier;
> Full of strange oaths, and bearded like the pard,
> Jealous in honor, sudden and quick in quarrel,
> Seeking the bubble reputation
> Even in the cannon's mouth: And then the justice;
> In fair round belly, with good capon lin'd,
> With eyes severe, and beard of formal cut,
> Full of wise saws and modern instances;
> And so he plays his part: The sixth age shifts
> Into the lean and slippered pantaloon;
> With spectacles on nose, and pouch on side;
> His youthful hose well saved, a world too wide
> For his shrunk shank; and his big manly voice,
> Turning again towards childish treble, pipes
> And whistles in its sound: Last scene of all,
> That ends this strange, eventful history,
> Is second childishness, and mere oblivion;
> Sans teeth, sans eyes, sans taste, sans everything."

Precocious children now and then anticipate this usual order wonderfully. Some of them keep superior ability afterwards, through life; others burn out early, or decline into commonplace people. Alexander the Great gained a battle at eighteen years of age, and conquered the world at twenty-five. Zenghis Khan is said to have raised a large army and defeated a rebel enemy at thirteen. Henry IV., of France, commanded an army at sixteen, and at nineteen was King of Navarre. Saxe was Field Marshal at twenty-four; Charles XII., of Sweden, was a conquering commander of armies at eighteen; Napoleon I. had the rank of General at twenty-five.

Mozart composed admirable music when only four years old. Rubinstein and Liszt were musicians at the age of nine. Cowley wrote and printed poetry at thirteen. Victor Hugo composed a novel at six-

teen; and, at seventeen, Bryant wrote his immortal *Thanatopsis*. Coleridge's *Ancient Mariner* was written at seventeen. Blaise Pascal, when twelve years old, without book or instructor, discovered many of the geometrical propositions of Euclid. At eighteen he wrote a work on a mathematical subject, and at nineteen invented a calculating-machine. Bernini, the sculptor, made a fine bust in marble at ten years of age; he lived until his eighty-second year. Not so fortunate was the prodigy Christian Heinecken, of Lubeck. At two years (it is said) he was versed in the history of the Bible; by his third year he had learned French and Latin; in his fourth he studied church history, and then died—of course!

John Stuart Mill began Greek with his father at three, read Plato at seven, wrote part of a history of Rome at nine, studied logic and political economy at twelve and thirteen, and wrote articles for the *Westminster Review* at nineteen. Sir William Rowan Hamilton was a wonder of learning at twelve, and so were Visconti, Gassendi, and a number of other celebrities. Lamartine says that Byron fell violently in love at eight years of age, Dante at eleven, and Lamartine himself at ten!

But, is such precocity desirable? No! And least so of all is *forced* precocity; the child-mind being stimulated to premature and exhausting effort. Better, when the boy or girl is very ambitious, to *retard* its mental labors; and to encourage some active employment, so as to develop the *body* in right proportion to the brain. Not a few lives of brilliant promise have been cut short in youth by neglect of such prudence.

Also, some men who became great in mature life have not been at all brilliant in boyhood. Such were Shakspeare, Molière, Gibbon, Franklin, Scott, and Patrick Henry. Shakspeare's first poem is said to have been written after he was thirty years old. Cowper's first volume of poems was published when he was fifty. The great surgeon Velpeau did not begin the study of his profession till he was near middle age. Goldschmidt of Berlin, one of the leading astronomers of this century, spent his youth in business. At thirty he began the study of painting, and occupied himself for fifteen years with art. At forty-five he began astronomical observations; and then, in nine years, he discovered thirteen asteroids, and fixed the positions of three thousand stars not before marked on any chart of the heavens. Tissot, an able observer, said: "Of ten children, I should prefer that the one who is to study through life should be the least learned at the age of twelve."

At the other end of life, we find some men and women retaining all, or nearly all, their mental vigor to advanced age. Thus it was with

Plato, the "divine" philosopher; with Sophocles, the great tragedian, who wrote "Œdipus" after he was eighty, and died at ninety; with Pindar, the finest lyric poet of the Greeks; with Hippocrates, "father of medicine," who lived to be more than a hundred years old; Isocrates, who wrote a work, "Pan-Athenæi," at ninety-four; Titian, who painted master-pieces at Venice till he was ninety-six, and then died of the plague; Michael Angelo, great in marble as well as upon canvas, till his end at eighty-eight; and Alexander Humboldt, the first scientist of our age, still accumulating knowledge till his ninetieth year.

Hobbes, the English philosopher, translated Homer at eighty-seven. Lord Derby and William Cullen Bryant did the same literary work after they were eighty. Rogers, the banker-poet, died at ninety-three; Lord Brougham at ninety; Sir David Brewster at eighty-six; Caroline Herschel, astronomical assistant to her renowned brother, survived him and died at ninety-seven; Mary Somerville finished her remarkable scientific book at ninety, and died nearly two years afterwards. Joanna Baillie, dramatic poet, lived to her ninetieth year; John Wesley, founder of Methodism, died at eighty-eight; Ranke, the German historian, is yet busy with his books at eighty-eight, as our George Bancroft is now revising his History of the United States at not far from the same age. Raumer is still a professor at Berlin in his ninety-second year; and in 1883 Chevreul gave lectures on chemistry in his ninety-third year. Sir David Brewster's mind was ardent in activity till eighty-six. Rossini, in his seventy-fifth year, composed a magnificent "Hymn for the Emperor," for the Paris Exposition of 1867. Auber, at eighty-seven, completed an opera, considered to be equal to the compositions of his youth.

Among men of affairs in public life, Cardinal Caraffa became Pope Paul IV. at seventy-nine, and continued to be a vigorous head of the Roman Church for several years. Cardinal Fleury was prime minister of France till ninety; Cardinal Richelieu was clear and active minded till ninety-three. The Duke of Saldanha, in Portugal, changed the government of his country by a military *coup d'état* at the age of ninety years. Thiers, the French statesman and author, was nearly eighty when he became President of the French Republic. Several of England's most successful political leaders have kept power in their hands late in life; notably Derby, Palmerston, and the noblest of them all, Gladstone.*

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* Of other highly intellectual men, Euripides lived to be eighty-five years of age; Pythagoras, eighty; Thucydides, eighty; Buffon, eighty-one; Leewenhoeck, ninety-one; Newton, eighty-four; Young, eighty-four; Kant, eighty; Goethe, eighty-two; Samuel Johnson, seventy-six; Leibnitz, seventy; Franklin, eighty-five; W. Herschel, eighty-four; Voltaire, eighty-four; Chalmers, eighty-three; Coke, eighty-four; Harvey, eighty-one.

But we must not forget that these are exceptional persons; the general rule is quite otherwise. Reason does not commonly mature fully much before thirty years of age, and the active intellectual powers are apt to begin to decline before seventy years. Even imagination is not at its best usually before twenty-five; and it grows dimmer in brilliancy towards middle age. Skill, acquired by time, may, it is true, then compensate for this in artistic work; many of the finest poems, and some of the most admirable paintings, have been perfected by those who had passed their sixtieth year. Does *wisdom* always belong to old age? No. *Experience* is its possession, of course; but the ability of the aged to use knowledge lessens when the step totters and the eyes grow dim. Even the old doctor cannot always give so good advice as the well-trained younger, or, at least, middle-aged one. Especially are old men less fitted for dealing successfully with *new* problems—new questions—new perplexities. What they have seen often, they understand well, better than others; but what differs entirely from their experience baffles them.

SEX.

Endless arguments have been wrought out to prove or disprove the superiority of the masculine over the feminine mind. I will not go either with Mohammed, who denied that women have souls, or with Mrs. Farnham, who regarded man as only imperfectly developed woman. Suffice it to say that the sexes are mentally *different;* while *absolute* superiority should not be claimed by either. One is the complement of the other. Humanity needs both; the stronger reasoning intellect and mental persistence of man, and the quicker and more refined perceptions and intuitions, and the predominating affectional and impulsive nature, of woman. Every noblest man has some feminine traits, not to weaken but to adorn his manhood. Every noble woman has something of manlike strength; which is perfectly compatible with the gentlest and most lovely womanhood. As Tennyson has written:

> "For woman is not undeveloped man,
> But diverse; could we make her as the man,
> Sweet love were slain; his dearest bond is this,
> Not like to like, but like in difference.
> Yet in the long years liker must they grow;
> The man be more of woman, she of man."

Practically applying these thoughts, we may say that most men's minds want for their perfecting more tenderness, and most female minds more strength. Right education of both will promote such a con-

summation for all. As this is not a book on education, we must be content here, without discussion, with stating two leading principles, not yet everywhere accepted, which I believe to be important and true:

1. Nothing in the physical or intellectual nature of women affords reasons for giving them a different school, college, or university education from men.

2. The best possible arrangement for the education of both sexes is that of *co-education.* The interest of this second proposition is so great that I am much tempted to dwell upon the proof of it; but I must refrain. Just this much may be said: God's ordinance is for man to live in *society;* what begins in the family, where brothers and sisters are brought up together, cannot be interrupted in school and college life without serious moral and mental injury to both sexes. This, moreover, is proved by *experience;* that is, the testimony of those connected during the last fifty years with institutions in this country (now large in number), where boys and girls, young men and young women, are educated together, has been, with no important exception, very strongly in its favor. Only those fear it who have never seen its trial.

BODILY HEALTH.

Soundness of body is necessary to full efficiency of mind. Once it was almost imagined that the contrary of this was true; that soul and body were, so to speak, enemies of each other, and that the student, at all events, must maintain the triumph of his intellectual powers at any cost to his body. Some excuse for this error is to be found in the number of remarkable persons who have accomplished wonderful things notwithstanding poor health: as Cardinal Richelieu; William of Orange; Descartes, the philosopher; Melancthon and Calvin, the reformers; Blaise Pascal, Baxter, Paley, Locke, Watt, Cowper, Campbell, Kitto, Robert Hall, Hannah More, Thomas Hood, Leigh Hunt, Frederick W. Robertson, John Stuart Mill, Charles Darwin, Herbert Spencer, Dr. Channing, Margaret Fuller, and Prescott the historian. But many of these had short as well as brilliant lives. On the other hand, as long a list, or longer, might be easily made of those whose intellectual greatness was sustained by a strong bodily constitution. Such were Julius Cæsar, Charlemagne, Washington, Franklin, Napoleon, Wellington, Sir Walter Scott, John and Charles Wesley, Michael Angelo, Titian, Leonardo da Vinci, Cuvier, Humboldt, Audubon, Agassiz, Brougham, Palmerston, Gladstone, Daniel Webster, Abraham Lincoln, Shakspeare, Milton (except his blindness), Goethe, Bryant, and Tennyson. Al-

though very fine work may be, and often has been, done by men and women frail in bodily frame, *muscular intellectuality* (to imitate a phrase of Charles Kingsley's) is that which, at least, is likely to last the longest.

All influences, therefore, which promote bodily soundness and vigor are favorable to mental excellence and performance. Pure air is one of these. How dull one often feels in a close room! Frederick W. Robertson, an admirable speaker and writer, said that he could only compose well in a room whose windows looked southward. In our own climate some men are always melancholy (as others are neuralgic) when the wind blows from the east. Frenchmen and Italians can hardly exist in the winter atmosphere of England; while in Italy the wind called the sirocco, blowing from the Mediterranean, is often very depressing to mind as well as body. Dr. Isaac Ray says (in his capital little book on "Mental Hygiene") that in La Plata, when a certain wind blows, many people shut themselves in their houses and give up business. If any one is then quarrelsome or petulant, the excuse is, "It is the north wind, señor." On the other hand, almost all riots and other popular disturbances (like fevers and the cholera) occur during warm or hot weather.

Food and drink, also, affect the mind very much. "Drink beer, think beer," is an old maxim. Does this account for the cloudiness of German metaphysics? Yet German learning is the most stupendous in the world. What might that nation not have been and have done without its beer and "infinite tobacco!"

Gluttony is sure to obstruct, if not to destroy, intellectual activity. Alcoholic stimulants quicken it momentarily with a false and fatal flame of excitation. There is some truth in the proverb, "When the wine is in, the wit is out." Men laugh loud and often over their glasses, and mirth "sets the table in a roar," not because of the wit that circulates, but because they are easily made merry by their potations. Speeches that read well afterwards are made commonly at cold-water dinners; or at least they were composed while the orator was sober. Exceptions to this occur with men so long accustomed to the spur of liquor as not to be *up to par* without it. But what a sad humiliation is this! Think of a great man, a statesman, refusing (as in an instance of which I know) to attend a dinner where no wine was served, unless he had a bottle of whisky under his end of the table, without which he could not make a speech! Such slavery to stimulation seldom allows its subject to live many years.

Opium is no less dangerous as an artificial aid to mental brilliancy. Coleridge suffered half his life to be eclipsed by it; De Quincey, in his

"Confessions," has described its terrible power; Dante Gabriel Rossetti was among its victims.*

Even tea and coffee may be used as stimulants abusively, and to much disadvantage. I remember a distinguished lecturer, who would drink seven or eight cups of tea before an evening lecture. They would have hurt him less if he had taken at least half the amount after instead of before the mental effort. The time when stimulation does the least harm is when the body or brain is exhausted by severe exertion.

Exercise of the muscles is wholesome for brain-workers, as well as for others. They may not need it to increase their strength to lift, to throw, or to run; but to keep up a right movement of the blood; to promote digestion; and thus to favor the general health of the whole body. Sitting too long at a school-desk, or in a merchant's counting-room, or a lawyer's consulting office, makes the blood centre too much in the head. No one should, if it can be helped, sit more than one, or at the most two hours, at a time, engaged in brain-work without some change. Even getting up, running out of the room, and returning in two or three minutes, will do a great deal of good. In a school, for example, it is desirable for all pupils to change their room, when it is practicable, with every change of lesson. If not that, they should, once an hour or oftener, leave the school-room, caper around a bit, and return. *Recesses* are, for the same reason, of great value in schools; especially if, in some of them, *calisthenics* (light gymnastics) be practised. The longer the school session, the longer ought to be the recess. But, on grounds of mental and bodily hygiene, I do not believe in *long* school daily sessions. More can be taught, as a rule, to young scholars in *four* hours daily than in *six*. Why? Because, with the first allowance of time, they may be kept fresh and wide awake for their work; under the longer session, or even if the same be divided into two sessions, they become so worn and jaded (teachers and scholars both) as to accomplish very little at last. *Half-time* industrial or manual labor schools, which have been tried successfully in many places, have shown that boys and girls who work half of the day, and study or recite in school the other half, really learn as much in a year as those who spend the whole day in school.

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* Or possibly of *chloral;* whose power over its *habitués* is sometimes as absolute as that of opium or alcohol.

SLEEP.

Every one knows that we must sleep some time, or die. But very many people do not appreciate the truth that we must sleep *enough* in every twenty-four hours, or we suffer in health. Ambitious students have sometimes imagined that, by sitting up very late, or rising long before dawn, they could excel, in mental acquirement and performance, those who are lazy enough to lie in bed until they are rested. But, if such do, in some fashion, *more* work in *quantity*, it will assuredly, in time, run down in *quality;* or else, the "waster of midnight oil" will waste his own strength and become bankrupt altogether in health. So Hugh Miller, the Scotch geologist (author of "Footprints of the Creator") wrought, until his overtaxed brain gave way, and in a frenzy of distress he put an end to his life. So Dr. Kane, the Arctic explorer, after surviving the dangers of the frozen zone, said of the immortal book in which he recorded the history of his voyages, "that book will be my coffin." So have not a few other gifted men and women toiled on, regardless of rest, until the inexorable law of nature cut short their working days.

Dr. Franklin's maxim, "Early to bed and early to rise, makes a man healthy and wealthy and wise," is true enough, if we take both ends of it together. But *late* to bed and early to rise won't work well at all. Sleep is a debt to nature; if it be not paid, execution of judgment follows, either soon or late.

How much sleep is necessary? Babies just born ought to, and if healthy will, sleep more than half of their time. Children ten or twelve years old naturally sleep about ten hours every night. Up to eighteen or twenty years they ought to have nine hours; and at all ages eight hours nightly will be better than less; except that persons over seventy often incline to be wakeful at night, making up with a nap at some time during the day.

Wonderful stories are told about certain great men sleeping very little; Frederick the Great, Napoleon I., and Alexander Humboldt, as examples; only four or five hours of a night. But Prince Charles of Hesse does not confirm this account of Frederick; and Bourrienne, Napoleon's private secretary, in his Memoirs, says that he was commonly a good sleeper. Before or after a battle, he would sometimes be awake for a long time together; but after the excitement was over, he would sleep for twelve or eighteen hours at once. General Pichégru, it has been asserted, slept, during a whole year, but one hour in the twenty-four. I am not able to believe this. Nor is it probable that

Alexander Humboldt slept so little as has been above said; although he did not deny it when the subject was mentioned in his presence. It is extremely improbable that any one can lead an active life, or do much work, especially *brain-work*, for a long time together, with less than six hours of sleep in every twenty-four. Seven hours may, perhaps, be named as the ordinarily *necessary* amount for health. Sir Isaac Newton spoke of his requirement of "eight or nine hours" of repose in the midst of his scientific labors. The brain is the organ which alone can be said to sleep absolutely; and it must do so, or the wear and tear resulting from its action, in thought, perception, and emotion, cannot be repaired.

Continuous sleep is much more restorative than that which is interrupted. Sailors' "watches" of four hours each strain the brain, until *habit* somewhat modifies nature. *Children*, especially, should be allowed to finish their repose undisturbed. I would never wake a sleeping child; when its sleep is out, its eyes will open of their own accord. If the house is on fire, carry it to a place of safety without awakening it.

Naturally, the *time* for sleep is in the night; but people must still have their sleep in the Arctic zone, where the day and night alternately last for nearly six months. In civilized life, also, we have to change some things (the less the better) from the state of nature. If it is not possible to go to bed with the birds, we must not expect to be able to rise in the morning with their earliest song. Reading and writing men sometimes find they can work best when all is quiet, near the midnight hours; but then they must *make it up* in the daytime, while others are astir.* *The secret of doing a great deal of brain-work is to take a great deal of rest.* Keep the axe *sharp*, and it will cut down more trees in a day than one allowed to grow dull will do in a week.

EDUCATION.

"Next, the whining schoolboy, with his satchel,
Creeping, like snail, unwillingly to school."

Look into a *kindergarten*, some morning, and you will find it hard to realize Shakspeare's picture. Nor, even in schools for older boys and girls, is there always now any unwillingness or whining. The rod of the old times seems almost to have budded, like that of Aaron. Yet, for girls at least, the doctors are afraid of education. Has the child a

* More than half of this book has been written between the hours of ten and twelve at night.

headache, or a pain anywhere? "Take her away from school." We do not wish at all to condemn the proper caution of physicians; only, just now, the reaction is rather extreme, from the time when this whole subject was treated with indifference. When a girl of sixteen complains of a pain in the stomach, the doctor probably asks, "what has she been eating?" When her head aches, it may be well also to know how late it was when she returned home from yesterday's afternoon picnic, or from the party last night. In other words, school is often blamed for what home or "society" really has done.

Need education ever interfere with health? No! The brain requires exercise and development as well as the body, and what is good for one part of the system is good for all. It only needs that the conditions of health be remembered and attended to in school as well as elsewhere. What are those conditions?

First, the **situation** of the school ought to be a healthy one. Best of all, will be in the country. When in the city, it should be in a high and open place, having more than twice as much space as the building occupies, and with trees and grass.

Next, as to **construction.** Two stories will be better for a school building than three or more, especially better for the teachers. Let it front so that its *corners* look north, south, east, and west; then the sun will enter all parts of the house every day, and at the same time the glare will be nowhere excessive. The school-room should be large for the number of scholars; not more than thirty being seated in a room about thirty by twenty feet, with thirteen to fifteen feet for the height of the ceiling. Windows ought to be so many and so large as to equal one-fourth or one-fifth of the space upon the floor. They should be high, reaching nearly to the ceiling; but they need not go down to the floor. Upper light is the best for reading or work in the room. Windows should be so placed (or seats and desks so arranged) that the light, if coming from one side only, should fall upon the left of the scholars. Then the shadow of the hand, in writing, does not obstruct the view. But windows on both sides will do, or on the left side and behind; *never in front* of the scholars. The ceiling should be white, the walls of some neutral tint.

Night light, for study, must be *abundant* and *steady;* otherwise it often injures the sight very much. Gas and candles are both more apt to flicker than good coal-oil lamps. Eyes are often injured in schools and colleges; but they *need not be* so. The causes of such impairment of sight are, chiefly, imperfect light, a stooping posture in reading, bad type and paper, and a close atmosphere in the school-room. Under such influences, while of boys entering primary schools in Germany only

from five to ten per cent. may be nearsighted, of those in the gymnasia the number often rises to twenty, and in the universities to fifty or sixty per cent. In this country it is not quite so bad; but defects of vision, greater or less, are much too common here also.

An important point is, that children whose eyes are naturally in any degree defective should have them examined by an oculist, and *proper glasses* selected, to correct their error of vision. Without this precaution, there may be a perpetual strain in using them; and thus not only their sight is made worse, but headache and general ill health may be brought on. (About **eyesight** more will be said in another part of this volume.)

Ventilation and **warming** are as important in schools as in any other kind of buildings. Exactly the same principles and methods apply, however, as have been already considered in connection with **Our Homes**; and therefore they do not need to be repeated here.

Attitudes in school life have some consequence. Sitting, standing, or walking constantly with the shoulders rounded, not only gets the *habit* established, but, in early life, while the body is growing, allows the *bony frame* to set permanently into an awkward, ungainly shape. Yet not every one can sit straight for hours together without support to the back. There ought to be comfortable seats in school; but pupils should be taught to *keep the figure well up in shape* habitually; with the shoulders back, the head not unnecessarily bent forward, and with *no twist*, or elevation (if avoidable) of one shoulder above the other. Rising to recite is a good practice; every change of position is a refreshment. Standing *long* (more than five or ten minutes at once) at the blackboard is not suitable; especially for girls.

Hours in school should not be too many, as already said a few pages since. A child six or seven years old cannot, generally, keep its attention fixed for more than fifteen minutes at once, without some interval of change. At twelve years, half an hour will do; with older scholars, forty, forty-five, or fifty minutes. I believe that *adult* students do best (in attending university lectures, for example) with somewhat less than whole hour divisions for their class exercises. Four or five school hours in a day, at the most, with one or two hours besides for home study, will be enough anywhere, not only for health, but, in the long run, for the greatest amount of acquirement.

Jonathan Edwards studied sixteen hours a day. Some Germans and a few others may do so now, and survive it. But ninety-nine in a hundred Americans, at all events, will find ten hours the most they can give to brain-work daily with advantage, and eight hours will be a better usual average for effective results. Lord Bulwer Lytton, who read and wrote a great deal, worked regularly only three or four hours a day; for

the special reason that thus he could best keep his head clear and bright. Over-work jades; and jading is always fatal to good mental performance.

Exercise and recreation, schoolboys and girls, and college students must have, between times; in recesses and intervals. Calisthenics (as before urged) are very useful in schools, particularly for girls; most of all, in properly adjusted moderation, for thin, pale, shy, and delicate girls (the very ones who at first don't like them), who lack muscular development. Light wooden dumb-bells are, for such exercises, much better than empty hands. For young scholars, fifteen to twenty minutes at a time will answer; best out of doors, but if not, marching through halls and rooms with all doors and windows wide open. Cricket, tennis, and other out-of-door games are also very good of afternoons.

Task-work in study must always be moderate in amount, proportioned to the capacity of each scholar. It will not do to remove all difficulties; power grows with action which requires effort. Discipline is one means towards acquirement of self-command. But the wisest teachers will always endeavor to induce their pupils to *like* their work as well as or better than play. *Zest* is the best stimulant possible for study. No one, then, should be asked to do more than he or she can reasonably do within the time allowed.

Worst of all influences in regard to mental health in school and college are those of competition for prizes and public distinctions. Girls, especially, are often injured by these. Instead of them, besides interest in the work itself, there should be, as impelling motives, a high ideal of culture and attainment, and such rewards and honors as *all* may reach with proper industry; not such as only one, two, or three may get, to the disparagement of all the rest.

Out-of-school life, during the educational period, is of great, and frequently unappreciated, importance. Social distraction, and especially late hours at night, wear upon the brain and nervous system, and try the general health much more than the ordinary work of the schools. Some time hence, the universal prevalence of co-education may solve the problem—how the social nature may, along with the intellectual, have its development all through early and adolescent life.

Two great physiological principles lie at the basis of mental hygiene in its relation to education. One is, that the brain, the mind's instrument, is a material organ; growing, tiring, needing rest, having from time to time a *limited amount of energy*. To exhaust this is to injure; to repeat or continue overwork may derange, wear out, or kill. Careful training gradually increases capacity, ease, and endurance in mental work.

The other fundamental principle is, that the brain is a *multiple* organ, specially adapted to the functioning of *all our faculties*. Not believing in "Phrenology," as Gall and Spurzheim taught it, we yet know that persons differ immensely in their *kinds* of ability as well as in their disposition. Raphael could not solve Newton's problems, nor could Newton paint Madonnas and Transfigurations. Yet every one has *some* mathematical capacity; and Professor Walter Smith assures us that every boy and girl can learn to draw respectably. Again, blows upon the head have been followed by *partial* and *peculiar* disturbances or losses of mental power; showing a definite relation (not yet well understood) between different portions of the brain and the faculties. Also, when we tire of one kind of mind-work (as in reading or composition), another kind rests us; or, at least, does not tire nearly so much as continuing the same, after fatigue from it begins to be felt.*

From all these facts we infer, first, that some *variety* of study (like change in diet) is wholesome. Two or three studies can be carried on together (dividing the day between them) to greater advantage than one alone. Secondly, an "all-round" mental development, with all the faculties symmetrically brought out together, is the best. Hence the "elective" system, under which each student picks out just what he thinks will be most agreeable, is, during the *brain-growing* period, the worst possible. We ought to individualize in education. We ought to find out each one's capacities and peculiarities, and give no one more to undertake than he is able. But if we should find in an infant that one hand or foot is weaker and smaller than the other, would we cut this one off, or tie it up, and make the child only use that which is strong? When, in a team, one horse pushes forward, and another is sluggish, it is common to urge the latter, not the former, with the whip. If a man has on his farm one field very rich and productive, and another of poor soil, to *which* does he apply his fertilizers and cultivation?

Therefore, it may be insisted, on physiological and hygienic principles, that if a young pupil shows a deficiency in ability of a particular kind, his training should tend towards *bringing out and improving that capacity* up to the level of the rest. When men and women have grown up, and are about to begin their career in life, *then* is the time to *choose their specialties*. Before that period the great ends of education ought to be the acquisition (besides immediately useful knowledge) of mental power, balance, and self-command.

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* So, for example, Professor A. S. Hardy, when tired out with the preparation of an advanced mathematical text-book on Quaternions, went to Mount Desert and wrote his famous novel, "But Yet a Woman."

MENTAL EXCITEMENT.

Stagnation of mind is never wholesome; but neither is extreme or very frequent strong excitement, or *strain;* whether of the intellectual or of the emotional nature. Victims of over brain-work have been, as already said, not few. Among them have been Casimir Périer, Minister of State in France; Romilly and Castlereagh, English statesmen; Béclard, anatomist; Haydon, artist; Laman Blanchard, Henry Kirke White and Buckle, authors; F. W. Robertson, preacher; Buckland and Hugh Miller, geologists; Admiral Fitzroy, sanitarian; Moreton Stillé, physician and medical writer. Louis Agassiz, splendid as was his natural constitution, probably shortened his life by his immense naturalistic labors.

On the other hand, active intellectual lives are often long ones. Of one hundred and fifty-two distinguished French *savants,* the average age at death was sixty-nine years. Of Harvard University graduates, through a long period, the mean longevity was fifty-eight years; of eminent British poets, fifty-six years; of celebrated preachers, of different countries, sixty-nine; prominent statesmen, seventy years.

Dr. Elam gives the following table of the average age at death of men whose pursuits have involved much mental activity. Of each kind, twenty well-known examples were chosen:

Natural philosophers	75	years.
Moral philosophers	70	"
Sculptors and painters	70	"
Authors on law, etc.	69	"
Authors on medicine	68	"
Authors on revealed religion	67	"
Philologists	66	"
Musical composers	64	"
Novelists and Miscellaneous writers	62½	"
Dramatists	62	"
Writers on natural religion	62	"
Poets	57	"

Emotional excitement, while altogether safe in moderation, sets the world on fire, so to speak, when extreme in violence. It maddens individuals, disturbs communities, and sometimes embroils nations in war. How is it to be controlled? First, by such educational *training* as gives a balance to the emotional as well as the intellectual nature, and establishes the power of the **will,** acting upon **principle,** over the whole being.

How does the will act in controlling feeling? Just as it does in regulating thought; *not directly*, as by a mandate, "be angry," or "be kind," but by the **selective preference** of **attention**. We cannot *create* a train of thought; neither can we a mood of emotion. A thought comes; we *dwell* upon it, and it grows more distinct; it suggests other thoughts; our attention keeps these still passing before us. But, if we *turn away* from a thought, or a series of suggestions, they fade and disappear from the mind.

So, certain objects, impressions, memories, and imaginations, tend, of their own nature, to awaken particular emotions in us. If we *dwell* on such objects, either out of or in the mind, the *emotions* appropriate to them *continue* and *increase in power*. But if we remove our *attention* from the *causes* of any kind of feeling, it will pass away.

Marc Antony knew this well, when, instead of speaking long of Cæsar's death, he showed his body to the populace of Rome; letting his wounds, "poor, poor, dumb mouths," plead against his murderers. Every skilful orator uses a similar method, when he wishes to arouse feeling among his hearers. Every personator of character succeeds best when he endeavors to *put himself in the place* of him whom he represents; so that, by really *feeling* as he would, his *action* naturally follows.

With children, this is an important principle of management. If a child (especially a young infant) cries, not from pain, but from anger, disappointment, or fear, never *tell it* not to cry, for its automatic nature usually cannot help it at all. Put, instead, something before it, which will *take its attention pleasantly;* at once the phase of feeling shifts, and it is happy and "good" again. Cannot adults do nearly the same thing with themselves?

Yes, they can; and it is one of the secrets of self-culture, of character, and of happiness. Confucius recognized it, and expressed it in a maxim; but it was most wonderfully unfolded in the New Testament.* Two examples will be enough for our present explanation. Suppose a youth to be enamored of a maiden, who rejects his addresses as a suitor. Will he be wise to ask for the privilege of a close friendship, to linger near his Dulcinea, and to see her very often? No, indeed. Rather let him go West, go to Europe, go anywhere, and *forget* the cause of his trouble, as soon as possible.

Again, Shakspeare tells of one who let *grief* take the place of a lost darling; sit in her seat, walk up and down with her. If grief is cherished by the constant presence of objects associated with its occasion, it

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* "Look not," etc. "Whatsoever things are pure . . . . *think on these things.*"

will live, with a persistent shadow, such as is not designed by Providence. Time is the great consoler, by *substituting new impressions*, and thus new feelings, for the old and painful ones. Such is the right order of events. Monarchies have long made the most of this natural succession by encouraging the popular cry: "The King is dead; long live the King!"

Balance, in the emotional nature, is, from early life, of great consequence, and it is closely connected with a proportional development of the intellectual faculties. Most commonly here referred to by writers is the undue prominence of the *imagination*.

This faculty has its uses. The poet Wordsworth called it the handmaid of faith, the "faculty divine." It is not its power, or its culture, that is undesirable; it is its undue indulgence, its abuse. Let it be under control of the will, under guidance of sound reason, and it is one of the richest gifts in our nature. But the habitual "letting go" of the mind, in reverie, is not wholesome; we should live in realities, not in dreams. *Novel-reading* (unless in such moderation as reading but two, three, or four stories, only of the best, in a year) is a sort of mental opium-eating; it unfits the mind for real, earnest work.

Over-active imagination, with untrained judgment, promotes *credulity*. This is not at all confined to ignorant or stupid people. Some very bright minds, for want of solid discrimination, are subject to it. These (especially when not furnished with a satisfying religious faith) are often liable to be taken with each new "ism," every popular delusion, as it comes. Such intellectual and well-informed people I have known, who have, in turn, embraced phrenology, mesmerism, planchette, table-turning, and spiritualism; as, during childhood, they probably had, in turn, mumps, measles, scarlet fever, and whooping-cough. Two maxims will afford help in avoiding these mental maladies, which (especially spiritualism) sometimes lead to actual insanity.

First, be content, at every stage of progress, to prefer that opinion which has decidedly the *most* in its favor. Never expect all difficulties, on either side of any great question, to be removed.

Secondly, of *new* things, never believe anything until it is fully proven. Suspect everything that contradicts general experience. It may be even more probable that your best friend has been mistaken, than that a somnambulist could read a sealed letter with his eyes blindfolded. It was much more likely that Katie King and the Davenport brothers were adroit tricksters, than that a "spirit" would come from the other world to untie knots or put out a hand from a box in a darkened room. I believe the Bible, because, after thorough investigation, I find that its truthfulness *is fully proved*. But I should look with

very jealous and scrutinizing eyes upon any asserted modern miracle.* In short, *beware of isms,* and hold firmly fast to everything that you really do know.

SYMPATHY.

Wonderful indeed is the influence of one mind upon another, acting through the ordinary channels of sense for the conveyance of ideas and emotions. *Imitation* gives many examples of this. Let one of a company yawn; how soon will two or three others do the same. If one girl at a boarding-school has hysterical fits, probably several will soon be likewise affected. Worse than that, when a man hung himself to a certain post on a street in Paris, so many other suicides followed at the same place, that the police had to cut down the post.

Perhaps most fearful of all is the sympathetic rage that sometimes sweeps through a riotous mob in a great city. A "panic" during a battle exemplifies the same thing. Hence the prime importance of having leaders who cannot be so disturbed; or who, if they *feel* with the rest, act bravely nevertheless.

> "He is not brave who never felt a fear;
> But he whose manly soul its fear disdains,
> And nobly dares the danger nature shrinks from."

On the largest scale, great sympathetic movements affect, through the "nerves" of the telegraph, whole continents at once; nay, through ocean cables, even the world. Thus it was throughout the North when, at the beginning of our civil war, Sumter fell; and when, at the end of it, Lee surrendered, and afterwards Lincoln died. Garfield's death thrilled men's hearts with a common grief, in America, Europe, Asia, Africa, and Australia; wherever civilization had carried its means of communication.

But these are natural, healthy modes of sympathy. History tells of some having the character of epidemic madness. Such was the fanaticism of the Crusades; most sad and dreadful of all, the crusade of the children. Such was the witchcraft superstition of Scotland, and of New England, in Cotton Mather's time; and the bloodiest chapter in modern history, the French Revolution. Writers tell also of the self-scourging itinerant "flagellants" of the fourteenth century; of the

* The only thing of this kind I have had opportunity to examine closely, what is called "mind-reading," came to be clearly explained, upon well known physiological principles. Faraday showed this, also, of "table-turning."

"dancing mania" of about the same period; and of other similar epidemics in Europe in the fifteenth, sixteenth, and seventeenth centuries. One of these was the "mal de laira," or barking mania, which occurred in a part of France; where eighty women and children were successively seized by a propensity to bark like dogs At one convent a number of nuns in like manner mewed, for days together, like cats. Also, the "trembleurs," of Cevennes, shook terribly while they preached and prophesied. The "convulsionnaires" of St. Medard were made to spring about with violence by lying for a short time upon the tomb of the Abbé Paris. In a convent of Ursuline nuns at Loudon, France, the women, belonging to families of rank, were supposed to be possessed with demons. Clergymen endeavoring to drive out the evil spirits, became themselves affected. One priest, on this account, was condemned to death and executed. Another died in fury and despair; and a third went into a profound melancholy for life. During the witchcraft period, the most remarkable thing was, that a number of the women accused of being witches *confessed* being guilty of the charge; although this led to their being put to death.

Religious emotion is naturally intense, because of the supreme magnitude of the interests that awaken it. While a sound religious conviction and trust in the Divine government promote tranquillity of mind, *agitation* about religion is dangerous to some mental constitutions. "Camp meetings," of the old-fashioned kind, are not safe for those of all temperaments.* Let all things be in moderation, and promotive of a sound mind. "If the *truth* shall make you free, then are you free indeed."

Summing up, we may say that the influences which most favor mental health are these: a sound bodily *constitution;* well-balanced *education;* regular *occupation*, with some daily exercise in the open air; a sufficiency of regular *sleep;* moderation in *diet*, and in all *excitements* and *indulgences;* lastly, a reasonable, well founded, and tranquilly sustained religious faith; or rather, "faith, hope and charity, these three."

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* The extensive revival in this country in 1856–7–8, and that led by Moody and Sankey twenty years later, were notably free from unhealthy emotional disturbances.

HYGIENE OF THE SENSES: EYESIGHT.

Already, while referring to *education* in connection with mental and general health, the care of the eyes in their use for study has been considered. Of course, the same principles apply to their employment otherwise; as in the close looking necessary for printing with small type, watchmaking, etc. Plenty of light *on the work, without glare on the eyes,* will be needed for every sort of work. *Correction,* by proper glasses, of *defects of sight* is also very important. Some persons have suffered for years with headache, sickness of stomach, and general distress, produced by using their defective eyes (sometimes obliging them to give up the business in which they were engaged), whom a suitable pair of glasses has afterwards enabled to get on without any trouble. A young relative of my own, at ten years of age, could not read a letter without holding the page so as almost to touch the end of her nose. She could, in consequence, do almost nothing at school. But with glasses made, after examination, to suit her eyes, she was put for life upon the level of other persons. Such a change is almost like conferring a new sense.

Only skilful oculists can deal successfully with serious cases of defective vision. But the general facts on the subject can be understood by all. *Blindness* may be due to either of several causes: original imperfection of the eyes (born blind); paralysis of the optic nerve (amaurosis*); opacity of the crystalline lens (cataract); cloudiness of the cornea, or of the vitreous humor; disorganization of the retina. (See **Physiology**.)

Errors of sight, however, far short of blindness, cause much inconvenience. One of these is **nearsightedness** (myopia). Here the eyeball is too long (or the lens too convex), so that the rays of light from an object come to their focus *in front of,* not upon, the retina; unless, that is, the object is brought *very near* to the eye, so that the *divergence* of the rays coming from it *pushes back* their focus, and thus the image formed by them, upon the retina.

Some people are born with nearsightedness; others acquire it. Very often it is slight in childhood, and increases afterwards. If moderate in degree, it is partly corrected by the opposite change which comes on with the approach of old age.

All persons have a different *range of vision* at different times of life.

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* This was Milton's blindness. "So thick a drop serene hath quenched these orbs." An old name for the affection was *gutta serena*.

Our eyes are (as explained under **Physiology**) *at rest* when we look at a far-off prospect, or at the sky. *Accommodation* is necessary for looking at near objects. This has its limits. At ten years of age, a child with good eyes can "accommodate" its sight so as to see a thing clearly which is brought to within *three inches* of its eyes. This is its *near point.* At twenty years of age, this point is about four inches; at forty, seven inches; at fifty, usually twelve inches; at sixty, two feet. With healthy eyes the *far point* is in remotest space, where we see the sun, moon, and stars; although the *clearness* of vision for distant objects must, of course, depend upon their size and the amount of light coming from them.

But with nearsighted people the *far point* is, properly speaking, not far off at all. Some of them cannot recognize their own mothers at the distance of ten or twelve feet; many (without glasses) cannot tell a horse from a cow at twenty feet distance. Their range of vision, then, is very narrow. For things brought close to their eyes, their sight may be very good, indeed.

Another defect is **longsightedness** (hyperopia, or hypermetropia). Here the lens is too flat, or the eyeball is too short; the rays diverging from near objects, and even, in some cases, those from distant ones (parallel rays) make their image, so to speak, *beyond* the retina. In other words, the image on the retina is a confused one; because the rays are not brought to a focus upon it.

Old people have their "near point" pushed farther off (**presbyopia**), as above said. The lens in the eye becomes gradually harder, and will not yield to the muscle of "accommodation;" it remains at last permanently flat. Moreover, the adjusting muscle itself loses strength. This change begins in most persons between forty and forty-five years of age. There are exceptions, however; a few, even without ever having been nearsighted, can do without glasses to an advanced age. Even with these, *more light* is needed for old eyes to see well by; the *retina, optic nerve,* and *eye-brain* grow *less sensitive* to the stimulus of light. Hence there may be need of glasses to magnify objects in a poor light, when there is no loss of accommodating power.

Longsightedness (*hyperopia*, or *hypermetropia*) is met with not infrequently in young persons. Those having it can see well things at a distance, but, without glasses, not those brought close to them; the very opposite of nearsightedness.

Another far from uncommon error of sight is **astigmatism.** This is a kind of *uneven* or *distorted* vision. It results from the eyeball having its curves unlike; being somewhat *spoon-shaped* instead of spherical in form. This "spooniness" may be either horizontal or vertical;

and accordingly, lines, forms, and spaces are changed somewhat in one or the other direction. Many persons have slightly astigmatic vision. It is important only when considerable in degree. The *test* for it is easy enough.

If, in looking at the large N and Z of the above series of letters, the lines of both look equally heavy and dark, there is no astigmatism, either vertical or horizontal. If this is so also with P and B, there is none in any direction. At least one in three or four persons, however, will see somewhat heavier lines either in the N or in the P. To show that this is not owing to a real difference in the letters, let the book be turned half-way round; the lighter ones will then become dark, and *vice versa*.

In order to examine the *acuteness* of sight, as well as to ascertain the presence or absence of nearsightedness or farsightedness, types may be used, prepared for the purpose. Jäger's types range from 1 to 20; the extremes being these:

Brilliant, a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z.

R o m

Good eyes can read the smallest letters (Brilliant, etc.) within a range of from seven or eight inches to three feet. The R O M can be seen distinctly by them at from forty to sixty feet distance. Nearsighted and longsighted persons show, in looking at them, their opposite defects. Another, more conveniently available set of types, are those of Snellen, of which the following are examples:

A Z N L

One having perfect sight should be able to discern A in the above series at eighty feet distance; Z at forty feet; N at twenty feet, and L at eight feet.

Strabismus, squinting, or cross-sight, is due to a want of proper *balance* between the *muscles* which draw the two eyeballs outward (from each other) and those which make them converge (towards each other). Those having this defect, although they must always see two images for every object, learn by practice to *give attention* only to one object; and thus suffer but little inconvenience from the double vision. Squinting may be increased, indeed probably may be brought on in a child, by the habit of drawing the eyes often together to look at a very near object; as a hat-string dangling before the eyes. Children should, for this reason, not be allowed to squint on purpose, as they do sometimes for amusement. When strabismus is very bad, it may be cured by a surgical operation; the over-strong muscle being divided with a very delicate knife. As a *symptom of disease*, in those whose eyes, *when well, were straight*, squinting points to trouble affecting the brain. It is then usually of serious importance.

Correction of *nearsightedness* is obtained by the use of **concave** glasses, which spread the rays from distant objects farther apart, so that they will form a distinct image by focusing upon the retina. The concavity must be greater or less according to the degree of error in each case; which can be ascertained by careful trial. Those whose sight is only moderately shortened require glasses chiefly for reading and writing, or other close work. They see much more of the world, however, and to better advantage, if they use two pairs of glasses; the *stronger* pair for distant objects, and the *weaker* pair for reading or fine work.

Longsightedness is corrected by **convex** glasses, which bring the rays *sooner* to a focus, so as to make a clear image on the too short eye, or make up what is wanting with a flat lens in accommodation for near objects. Old people wear convex glasses, to read or write with. They

do not need them to look at things far off, unless *dimness* of vision comes also with age. The old person looks *over* his glasses in conversation, or puts them away for the moment, replacing them to read. Some, who have been moderately nearsighted in early life, find their "near point" put back, when they grow old, so that they need convex glasses for reading, and yet their "far point" is close enough to require the use of concave glasses for distant vision. Dr. Benjamin Franklin contrived to meet this double difficulty by having the *upper half* of each glass concave, for far-off objects, and the *lower half* convex, for those which are near. A minister, so affected and assisted, can look at his congregation through his upper half-glasses, and read the Bible or his sermon with the lower halves.

It is, of course, wrong for any one to use *too strong* glasses; they tend to make the eyes worse. But it is also a great mistake to *put off* using them when the eyes are strained for want of their assistance. Get those which make sight entirely comfortable, if you need them, and use them whenever they are required.

One eye may differ from the other in its manner of sight. This is often the case with those who do not discover it until it is proved by a careful examination. Such should always be considered in the adjustment of glasses to correct vision.

Astigmatism is corrected by means of **cylindrical** glasses. By these, the "spooniness," as I have called it, is sufficiently *reversed* to make equal clearness of vision in both directions. Sometimes a combination of near- or far-sightedness with astigmatism makes suitable the putting together of *double* lenses; one face concave or convex, and the other a section of a cylinder.

Color-blindness has, of latter years, attracted a good deal of attention. Lives have been lost, on ships and railroad trains, by pilots or engineers mistaking a signal of one color for another. *Red* and *green* are the colors most apt not to be distinguishable by those having this defect. About *one man in twenty-five* is more or less color-blind; of women, not one in a hundred.

Examinations are now made of railroad employés and others, to determine whether or not they see colors correctly. Merely *naming* the colors will not be enough, as that may be a matter entirely of education. The best method is, getting those examined to *match*, exactly, colored worsteds, of various hues, selected and arranged for the purpose.

Really bad color-blindness does not seem capable of any sort of correction. Slight degrees of it, however, can often be improved upon by early and constant *training* in the use and discrimination of colors. It

is by this *practice*, chiefly, that we can explain the rarity of color-blindness in women.

Weakness of sight (asthenopia) is often quite troublesome, without any error of refraction. Those who have it cannot read or write long without weariness and pain in the eyes. After an attack of measles this is not uncommon. It needs a great deal of care not to increase it or make it permanent. Having had personal experience of this difficulty from my boyhood, I have learned by necessity the advantage of **frequent short rests** for wearied eyes. Often, I close them for half a minute or a minute *several times in an hour*. Thus the pain and sense of fatigue are relieved, and work can be continued; without such precaution, absolute inability to use the eyes may follow, as was the case with me once for a whole year at a time.

Irritability of the eyes (which are naturally sensitive to the touch) is easily increased by slight causes. There is some wisdom in the odd old saying, "*Never touch your eye unless with your elbow.*"

HEARING.

Less exposed, as our ears are (that is, the *inner* ear, the real apparatus of hearing) than our eyes, to injury, they are nevertheless often subject to disease, especially in early life, as well as to impairment of sensibility in old age. *Diseases* of the ear do not call for special consideration in this place. (See **Special Diseases**, in **Domestic Medicine**.)

Deafness, or what, in less degree, we call *hardness of hearing*, may proceed from either of several causes: accumulation of *wax* in the ear; *thickening* of the *drum membrane;* obstruction of the *Eustachian tube* (connecting the middle ear with the throat); collection of *matter* in the middle ear; *perforation* in the drum membrane; destruction of the *ossicles* (little bones in the middle ear); *loss of sensibility* in the nerve of hearing, or in the "ear brain" (central termination of the nerve in the brain).

There is naturally always a small amount of wax in the ears; as it is disagreeable and adhesive, it seems to keep insects out. Irritation of the ear produces an increased secretion of waxy matter, which sometimes fills up the whole passage. With *great gentleness*, this may be taken out. A quill ear-pick may be very carefully used; but *the inside of the ear is almost as delicate as the eye*, and *inflammation* may be induced by even a slight degree of violence. What remains in the deeper passage may be softened by pouring in warm water, almond oil, or glycerin. Instead of a syringe, pouring in from a *teaspoon* will do, the head being turned well to one side. Best of all is the little *rubber-headed tube*, which cannot risk doing harm, as a syringe can, by the force of its jet against the drum membrane.

With a cold in the head, sometimes, that *membrane* will *thicken*, just as the cords in the windpipe do when one is hoarse. Or, under the same causation, the small passage called the *Eustachian tube*, from the middle ear to the upper part of the throat, may be blocked up. Generally, either of these effects of a cold will pass away in a few weeks. There is, at all events, no advantageous *domestic* treatment for them. And the same is true of the other causes of deafness named; which (except nerve-paralysis) follow, in a certain number of cases, scarlet fever or small-pox.

Gunners, on men-of-war, in time of action, may have their hearing impaired by the tremendous concussion of air from their cannon. Boiler-makers suffer likewise from the long continuance near them of loud hammering. Both of these, but especially the former, gain by opening their mouths at the time of explosion or other cause of loud

sound, so that the air can freely enter the Eustachian tubes, and *balance* that which strikes upon the tympanic membranes through the outer ears.

One precept of some authors who have written upon the care of the ears I must positively dissent from; that is, never to let cold water enter the ears. I am sure that cold or cool water is, for healthy people, the natural thing with which to wash *every part of the body.* From abundant observation and experience I can assert that washing the ears daily with cold water "strengthens" them, that is, gives tone to the surface, and renders them less sensitive and irritable; less liable to be affected by cold, and less apt to suffer with accumulation of wax. I believe this to be true of sea- as well as of fresh-water. One does not need to stop his ears while bathing in the surf at the shore, unless they are already in a diseased condition; although it is well to avoid the dashing of heavy breakers against the ears.

TEMPERAMENTS.

Exaggeration has prevailed in regard to the distinctness and importance of these. Yet the subject is naturally an interesting one. By temperament we mean a special constitution of body and mind, with tendencies of its own, which, when excessive, are morbid, but yet a marked degree of which is compatible with health.

An old classification was into the *Sanguine, Choleric, Melancholic,* and *Phlegmatic* temperaments. Later writers call them the *Sanguine, Bilious, Nervous,* and *Lymphatic.* But the term *bilious* is commonly associated with an unhealthy condition of the liver, whose secretion is either excessive or altered in character and action. Better, therefore, will be the use of the term *fibrous* in its place; as nearly corresponding to the ordinary description of the so-called "bilious" constitution, so far as it involves no deviation from health.

Our classification then is into the **Sanguine, Nervous, Lymphatic,** and **Fibrous** temperaments.

Of the *sanguine,* characteristics are a redundance of blood in proportion to the solid tissues; a large heart and excitable circulation; complexion florid, or at least easily heightened in color. Less constantly, the skin is fair, eyes blue or bluish gray, hair light. Disposition active, excitable, hopeful, fond of change and adventure. Under causes promotive of disease, *acute inflammations* and *hemorrhages* are frequent in such constitutions.

Some writers, as Richerand and Hammond, overstate, in my judgment, the mental tendencies of the sanguine temperament. In the words of the latter (in his book on Hygiene): "Inconstancy is the predominating influence. Good resolutions are formed but to be broken. Friendships are contracted soon to be abandoned for others, which in their turn are given up. In love the individual of sanguine temperament is fickle and faithless, and cares less for his honor than for his pleasure."

This is quite too much to assert of the effect of *any* temperament upon character. There are friends as faithful, lovers as constant, and good citizens as honorable, among those naturally sanguine as among those of any other constitution. But the *tendency* to ardor, confidence, and mutability, no doubt, does exist; whether or not it be governed, directed, and restrained by the will, is, in each instance, the vital question.

As examples of the sanguine temperament may be named Alexander the Great; Charles II., of England; Murat, the fiery soldier of the

first Napoleon; and General Custer, American Indian fighter, who lost his life and the lives of a company of soldiers, in the far West, by his rash daring. General Gordon, the hero of China and the Soudan, was a splendid specimen of this temperament.

In the *nervous* temperament we see a great development of the sensory and sensori-motor elements of the nervous system; which is susceptible, excitable, irritable, rather than strong. Persons so endowed are commonly slender in build, pale, and "wiry." Not always, but more often than not, their complexion is dark, or white without color; with dark eyes and hair. When disturbed by morbid causes, they are more than others liable to *convulsions* in childhood, *hysterical* attacks in youth, and to *neuralgias;* to *delirium* when ill, and *insanity.*

Of this temperament we can trace signs in the lives of Frederick the Great of Prussia, and his friend, the wit and philosopher, Voltaire; in the German poet, Schiller, as well as in the English poets, Pope, Cowper, Tom Hood, and Keats; in Beethoven, the musical composer; in John Randolph, of Virginia, and Rufus Choate, of Boston. One of the best instances of it under my knowledge was the late Professor George McClellan; a bold and skilful surgeon, father of General George B. McClellan.

The *lymphatic* temperament exhibits a preponderance of *lymph* and lymph-vessels rather than of blood. In it the *organic* or vegetative functions are more developed than those of the animal system distinctively so called. Its subjects are inclined to absence of color in the complexion, and to slowness and languor of body and mind. But here, again, we must remember that the question of *power* is quite another one from tendency. There may be as big a brain, capable of great things, with this as with other temperaments. As to diseases, the lymphatic are most prone to *dropsies* and *chronic* affections, such as *scrofula* and *fatty degeneration.*

Examples of this temperament among noted people are not easy to select with certainty. We may venture to name Rembrandt the painter, Dr. Samuel Johnson, Thomson (author of the "Castle of Indolence"), Wordsworth the poet, and Dante Gabriel Rossetti.

In the *fibrous* temperament, *solidity* is a characteristic. The bones, cartilages, ligaments, and muscles are well developed in proportion to the blood and lymph-vessels and nervous apparatus. A broad, square figure, neither very lean nor fat, with a clear, not florid complexion, and eyes gray or brown, belong to the best marked examples of this constitution. It is, with less excitability than the nervous, and less activity than the sanguine, the best temperament for *work* and *wear.* No special tendencies to disease belong to it.

Of famous people, such appears to have been, very nearly, the temperament of Socrates, Julius Cæsar, Peter the Great, John Knox, Oliver Cromwell, Cardinal Richelieu, Washington, Franklin, Napoleon, and Ulysses S. Grant.

Shall we venture upon an analogy with the creatures below us, in illustration of temperament? Is not the tiger a sanguine creature, the deer nervous, the bear lymphatic, and the elephant a big specimen of the fibrous make-up? Among nations, at all events, we can see the characteristics already described; in the nervous French, the sanguine Irish, the fibrous Germans, the lymphatic Turks. In the different periods of every one's life, some difference of tendency is usually observable. Infancy is at its best for health when inclined to be lymphatic; less secure, when nervous instead. Youth is proverbially sanguine. Middle life ought to be established with a solid fibrousness, whatever be its other endowments. Old age, at its best, may retain this tough temperament; but it often runs rather into the lymphatic constitution.

Nothing is more important, however, upon this subject, than the fact that *pure, unmixed* temperaments, such as those now classified, are *rare.* Almost always we meet with *combined* traits of two or more; as in the *nervo-sanguine, fibro-nervous, fibro-lymphatic,* or *nervo-lymphatic* systems. Of these every one may, with a little thought, recognize examples among his own acquaintances.

Composite temperaments may be, at least conjecturally, referred to some distinguished personages. Lord Byron, I should say, was nervo-lymphatic; Louis Napoleon, fibro-lymphatic; Goethe, fibro-nervous; Robert Burns, nervo-fibrous. Exemplary Englishmen show the *fibro-sanguine* constitution; the typical American is *fibro-nervous;* with "blood of fire coursing in veins of ice." Henry Clay and Abraham Lincoln were fine (though not handsome) representatives of this strongly marked type.

After all, mixed temperaments are the best; even those in which *neither* sort of constitution is predominant. Such have been seen in Goethe, Bryant, Webster, Humboldt, Garfield, and Gladstone.

Can temperament be *altered?* I believe it can, by careful management, especially in early life. Those of the *sanguine* constitution should eat moderately, especially of animal food; should take a good deal of exercise, not violent, but producing bearable fatigue; should avoid stimulants of all kinds, and take a good amount, say eight hours, of sleep nightly.

Nervous people should (unless exceptionally unable to digest it) drink *milk* instead of coffee or strong tea; exercise regularly, but

always short of fatigue; take a considerable amount of animal food in their diet; and *sleep nine or ten hours* in every twenty-four.

Lymphatic persons ought to eat rather sparingly, especially of bulky vegetable foods. They need somewhat less sleep than others; and should live as much as possible an active out-of-door life.

Those having a *fibrous* constitution, as above described, need to make no endeavor to alter it, but rather to preserve its strength and endurance. On the one hand, over-excitement, over-work, or worry may sharpen it into the *nervous* temperament; or, especially late in a life of ease and leisure, it may lapse into *lymphatic* relaxation. By proper care in our *habits*, then, we can make the most of our natural endowments and tendencies, and even improve upon them; so as to maintain, or at least promote, that balance which is most favorable to health and long life.

HYGIENE OF INFANCY.

So much has been said already in this book concerning **Food, Clothing, Bathing,** etc., which applies to the care of infants as well as to that of the health of adults, that much less needs to be here presented than would be required in a treatise entirely devoted to the subject of Infancy and Childhood. Some things, however, must be briefly repeated, with additions.

Two critical times, at least, belong to babyhood: those of **birth** and of **teething.** In our great American cities, as New York, Philadelphia, Baltimore, Cincinnati, Chicago, and St. Louis, multitudes of children have added a third; which may be repeated for them two, three, or four times before (if they survive) they pass into the comparative security of childhood. This is **midsummer weather in town.** We must say something especially about each of these dangers of infant life.

BIRTH.

A child is born into the world! It cries vigorously; very well. The doctor has tied the "cord" by which, till this moment, it had, during its months of gestation, been connected vitally with the mother. Through that both nourishment and air (without breathing) had passed into its system from hers, affording material and stimulus for its growth and development. Now, it must have a separate (though still dependent) existence. Nothing in the world is so utterly helpless as it!

Exhausted with her labor, the mother must be allowed to rest awhile. Another (a nurse or friend) takes the babe to another room, sufficiently warm. She rubs it all over carefully with fresh lard or oil (some doctors now prefer vaseline or cosmoline; I do not). Carefully, all over; for the material on the surface of the body must be all removed. The *mouth* and *eyes*, and inside of the *ears*, should be well cleansed with a *soft* sponge, or *soft* rag or towel, dipped into warm water. Then, after the greasing, white castile soap and warm water must be used to wash it thoroughly (gently, of course). Some babies, after this, will be as red almost as a brick. A few will have a fine red rash, called in the nursery the "red gum." Still fewer may be yellow for a few days: the "yellow gum." Neither of these is usually of consequence. Occasionally the yellowness may grow into a real "jaundice of the newly born."

The cord, at the navel, will come off itself within six or eight or

nine days. At first, the best thing to do is to cut a piece of old linen or muslin about two and a half inches square; nip out in its centre with scissors a hole large enough for the cord, and after smearing the rag well with *simple cerate, cold cream* (from the apothecary's), or *benzoated zinc ointment,* pass the cord through it, and double it over twice. Then a *light, soft* flannel band may be wrapped over this around the babe's abdomen, *not tightly;* just tight enough to stay in its place. Every day, when the child is bathed, put a fresh greased rag upon the cord. If there comes to be any odor to it, sponge it (with a sponge kept clean just for that) with *lime-water* instead of common water. Should any soreness or rawness remain after the cord drops off (as it should, after some days, without being pulled), a soft doubled rag or compress, thickly spread with benzoated zinc ointment or simple cerate, should be kept upon it until it is quite healed.

After two, three, or four hours of rest, the child may be put to the mother's breast. Before that, or later if the mother's condition cause delay, the babe *needs no food or drink,* and is better without it.

The first milk, called "*colostrum,*" is unlike what comes later, but will help to move the infant's bowels; which is well. It is *good for the mother* (under usual circumstances) to have the child soon at the breast.

Now we will suppose the first crisis to have passed. Babyhood has begun. How must it be cared for? Any mother of a second child can tell, as experience is better than any other teacher. But with the *first* baby, at least, much is yet to be learned.

NOURISHMENT.

Every mother should, if she can, nourish her own child, from her own breast. "It is as much her duty to suckle it as to bear it." This is nature's law, as well as the law of love.

At first, for a few weeks, *every two hours* will not be too often for the child to be suckled, even at night. But the night intervals should be gradually lengthened; so that by the third or fourth month *three* hours may intervene each time during the night, and two hours all day. Then, also by degrees, the between times should grow longer in the daytime. A child six months old may often be trained to take the breast every three hours through the day and evening, and not at all between ten or eleven at night and five, six, or seven o'clock in the morning.

Regularity is a great thing; to be aimed at and made a *habit* from birth. Never let a mother keep a babe, well or sick, dangling at her breast all the time, day or night; *especially not at night*, and most of all if it is *sick*. Then its digestion is sure to be weak, and its stomach needs intervals of rest. It may need more "coddling," carrying, and soothing, than when well; and, if feverish, it may be thirsty, and should have cold *water*, not milk, between times. This should then be given it, from a bottle or a teaspoon, instead of an excess of milk.

Both breasts should be used, in turn, as nearly alike as can be. Otherwise the danger of "gathered breast" is much increased. Without early care as to this, a babe may "take a set" against one breast, and so give trouble. After nursing, the nipple should be carefully dried with a soft towel. In warm weather, it is a good plan to sponge it first with water in which a little soda (bicarbonate) has been dissolved. If there is the least chafing, benzoated zinc ointment, or cold cream, may be applied; to be gently but thoroughly wiped off before nursing again.

A mother's care of *herself* is of the greatest consequence to her *child*. If she be much agitated in mind, or tired out with company, or have her digestion interfered with by unwholesome food, or disturbed by powerful medicines, *her milk will affect her babe*. Convulsions and death of an infant have resulted from a nursing mother being greatly excited by anger or alarm. Here, for example, is a case. A woman saw her husband in danger from a quarrel with a soldier, who drew a sword upon him, which she snatched away. Soon afterwards she gave the breast to her infant, eleven months old, and before in good health. The child took it for a while, then quitted it with agitation, and died in a few minutes.

Should a nursing woman take ale, beer, wine, or spirits to "make more milk" for her? No, no, no! No healthy woman needs anything of the kind; if she takes much of anything alcoholic, it *poisons* her milk for the child. Plenty of milk, and all other simple, nourishing, digestible food, after she has left her chamber, she should take. If these do not keep up her strength, she may have to wean, or partly wean, her infant. But let her take no alcoholic drink whatever, unless ordered by a competent physician. Alcohol is to be regarded as *medicine;* not food; especially for nursing mothers.

Some mothers, unfortunately, *cannot* furnish nourishment for their offspring. Either they have no milk, or very little, so little that a child cannot live on it; or they are in such feeble health that it will risk *their* lives to afford it; or indisposition may make their milk unfit, unsafe for nourishment. What then?

Certainly, some other healthy mother's breast will be the next best

thing? Can this be had? Far from always. A good wet-nurse may often be extremely hard to get. And one who is *not* good is worse than none. She must be sufficiently young, yet must have had some experience; twenty-five is about a good age. She must be *healthy, cleanly, kind, good-tempered, not stupid,* and *faithful.* If all these qualities can be found, for love or money, in one person, by all means have a wet-nurse.

If not, we must resort to the *bottle.* First, however, ascertain whether the mother has not *some* good milk, even though not enough. If she has *half* enough (as is the case with quite a number) let her give the babe the benefit of this, if it lasts, until the child has passed through the most of its teething, or at least has weathered its *first summer.* Let her nurse it two or three times in the day and evening, and give it (or have given to it) the bottle for the rest of the time.

Indeed, it is a good plan, under all circumstances, for a child six months old to *learn* to use bottle-food, so as to make the change more easy later, especially if illness or some other cause should oblige the mother to wean it suddenly.

WEANING.

This *never should* be sudden, if it can be helped. How soon should it come?

American Indian squaws are said to suckle their papooses through their second year; some Asiatic mothers, even till near the end of the third year. Why not? Another *gestation* may interfere with it; making the supply of milk less in amount, and less wholesome. Some have thought that the return of the monthly period stands in the way; but of this there is not sufficient evidence.

On the whole, if a mother can nurse her infant a full year, it will be well; if eighteen months, still better. When she has, up to two years, half enough for it, let it get what it can from her, and eke out the rest with outside nourishment. Never let a child be weaned in *summer* if it can be helped.

BOTTLE-FEEDING.

We speak of this at once, because the bottle is vastly better than the spoon. It imitates nature better; it allows the food to go more slowly into the stomach; and it gives the infant desirable exercise in taking it.

If, then, the child *cannot* have the breast of its mother, or of a suitable substitute, get for it a glass bottle, holding about half a pint, with

a rubber nipple, but without a tube. Two bottles, or at least two nipples, will be well to have, for alternate use and thorough cleansing of both. For a babe less than a month old, half a bottle at once will do for a meal. In a few months, it will readily take nearly or quite a whole one, several times a day. A child six months old can, and ought to, appropriate *three pints* of milk or more in twenty-four hours. Remember, a child has to *grow* as well as to live. Of course, we ought not to "stuff" it. When too much has been swallowed, it will often (and had better) be *thrown up*. If it be milk, this is then usually *curdled*. Untaught persons are frightened at this; but the fact is that milk is *always* curdled at the beginning of digestion. The natural acid of the stomach acts thus upon it.

After each time of use, the bottle ought to be *scalded* (that is, washed out with hot water); in summer time, or where the child is delicate, an added precaution is to add soda to the water with which it is cleansed.

MILK.

What shall "bottle food" be? *Milk*, of course, as the great staple article. Nobody has invented, or is likely to invent, anything half so good, *as a rule*. Even when some other foods are given, they are in most cases best added to or prepared with milk.

Much has been said on our previous pages (under **Food** and **Drink**) about the qualities of milk; how to tell good milk from poor milk, etc. Let us, then, here only emphasize a few matters.

Cow's milk is almost the only kind used in this country; here and there, goat's milk may be had. Cow's milk is *stronger* in "solid" contents than woman's milk, but the latter is sweeter.* Commonly, then, during the first months, a little pure water is added (half, or less, of the amount of milk), and a little white sugar. As the child grows older,

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* Professor A. R. Leeds (1884) gives as the result of eighty analyses of human milk, the following average composition for it:

Albuminoids (casein and albumen)	2 parts.
Fatty matter (cream)	4 "
Sugar of milk	7 "
Ash (mineral salts)	0.20
Water	86.80
	100.00

Cow's milk contains more than twice as much of the (nitrogenous) albuminoids, and considerably less sugar. Woman's milk is rather more dense than cow's milk, having a specific gravity of 1031, water being 1000, and cow's milk 1029 to 1030.

less water is needed, and within the year, often, none at all. A great mistake was formerly made, in mixing two pints of water with every pint of milk; the poor things sometimes, no doubt, starved under such a regimen.

But, sometimes, the *thicker* and *harder* curds made in the stomach with cow's milk may be difficult for the babe to digest. It becomes colicky and fretful, or it refuses the bottle. Then we must add rather more water, and something else to help to *diffuse* the clots, thus keeping them from forming solid masses.

Starchy (farinaceous) materials will do this pretty well. Such *alone* will not nourish a child fully, as explained in our **Physiology**; arrow-root, farina, and other starches contain *no nitrogen*, and some of this element is indispensable for the growth of muscles, bones, and brains. Moreover, during the first three or four months very little saliva or pancreatic juice is formed, and, without these, starch is not digested. But the *mechanical* qualities of starch fit it for mixing up the casein and albumen of milk in the fluids of the stomach, and so promoting its digestion.

Simple articles, especially *barley, rice,* and *oatmeal,* are commonly available for this purpose. Either of them does best when ground (or beaten in a mortar) to a fine powder for use. *Barley*-water answers well when the bowels are about right (that is, from two to four *moderate, natural* passages daily); *rice,* when there is diarrhœa; *oatmeal,* when the child is "bound," or not free enough in the bowels.

For barley-water, a teaspoonful of barley-meal for a two or three months' old infant, two teaspoonfuls for one over six months, may be mixed with a tablespoonful or two of cold water, and then put into a pint of water. Bring this to the boiling-point, and *boil it down* to half a pint. (With an ordinary fire, this may require half an hour or more.) Strain it through a fine sieve or a clean linen cloth, and stir it in with a pint of milk, adding a *little* salt, and an even teaspoonful of granulated white sugar. Put what is not used at once, in a *cold* place (on ice, if it be summer time, or in the spring-house in the country) to keep for the next feeding-time. Never give milk twenty-four hours old to a young child, under any circumstances.

Rice and oatmeal may be prepared in the same way, and used according to the state of the child's bowels, *when milk alone does not appear to digest well.* Should neither of these simple additions meet the difficulty, you may safely *try* some of the "infants' foods." Mellin's, Horlick's, Nestle's, and Imperial Granum are, I think, the best. These "foods" are not, like arrow-root, sago, and tapioca, merely *starches.* They contain some also of the *nitrogenous* materials. Imperial Granum, for in-

stance, is reported to consist of selected and carefully prepared *wheat.* Similar in nature are *nutrina* and *papoma,* and *cerealina.* Dr. J. F. Meigs' food is particularly designed for infants with weak bowels. For making it, take a piece of gelatin two inches square; soak it awhile in a little cold water, put it into a pint of water and boil it down to half a pint. While it is boiling, add to it half a pint of milk and a tablespoonful of cream, with a little white sugar; then it is ready for use. It would be hard to prove one of these foods, as a rule, to be much better than another. Some suit one child, some another; and all of them are valuable as *occasional additions to,* or *variations from,* never as total substitutes for milk. *Condensed* milk may be used when you cannot get *reliable fresh* milk; only then. It needs no additional sugar. One or two teaspoonfuls of it will be enough for a bottle, at least for a *young* infant.

It is not necessary, indeed it is hardly desirable, to ask a dairyman to furnish only the milk from one cow. You must know the cow very well to be sure that its milk is the best. A *good dairyman* is the best dependence of all; and there is no harm in mixing the milk of several cows, all equally fresh. What ought not to be done is to mix *two days'* milks together. Thorough *scouring of the pans,* and keeping milk in a *pure atmosphere* (as well as a cool one), are of extreme importance.

When milk is served only once a day in hot weather, it had better be brought at once to the boiling point,—to make it keep better,—and then set in the coolest and cleanest part of the house; best of all, put on ice.

A young infant, under a year old, had better take all its food *warm;* unless in the torrid heat of our midsummer. With the thermometer from 95° to 98°, one does not, young or old, want anything warm, inside or out.

If there be a sour smell on the breath, or sourness of the curds thrown up, or colicky pain after feeding, or beginning looseness of the bowels, *lime-water* should be added to the bottle-food. A tablespoonful to the bottle will not be too much. It is always harmless, if the bowels are not constipated; and it often does *a great deal of good.* When *very* tough curds are formed after taking cow's milk, a pinch of *soda* (bicarbonate) will help to dissolve them still more effectually than lime-water or the starch foods. But soda must be used in *small* doses, and *occasionally* only. Lime-water may be, if called for, an every-day remedy for sourness of stomach, especially with a disposition towards diarrhœa.

For *thirst,* between feeding-times, in summer weather, the best plan is to give cold water moderately, and supply from time to time a soft clean rag containing *pounded ice* for the child to suck. When a sick child has fever, however, it may often need to drink a good deal of water.

CLOTHING.

Referring again to what has been already said in another part of this volume about clothing for persons of all ages, we may now shortly repeat some main things in regard to babies.

Let their clothing, from birth, be *warm* enough and *loose* enough for comfort. No tight bands should ever be put on them. Some parents, in over-anxiety about cold, put on three times as much as is needed, and then shut all their chamber and nursery windows and doors, with big, hot fires; wondering, then, that their babies are fretful, get skin diseases all over, and often seem to catch cold almost every time they are taken out!

Babies resist actual cold less safely than older persons; but just *enough* clothing is always better than too much for them. And they do not need to have the rooms they live in any warmer than we do—say 68° to 70° Fahr. usually. They are also more hurt by close, foul air than grown people are.

When they are old enough to wear short clothes, a common mistake has been of an opposite kind: to leave their *arms* and *legs bare;* they are so pretty thus! But many an attack of croup and of inflammation of the lungs, sometimes fatal, has followed such exposure in a chilly atmosphere. Children should have *no less* protection of their limbs from cold than men and women. Even though, when healthy and active, they do not seem to feel it; it is not safe.

Very important is the *changing* of clothes with infants. When their thighs are wet, and all next to them is soiled, they should be changed *at once*, always. Neglect of this may cause chafing of the skin, very disturbing to the child, and sometimes as bad as a burn. A soft sponge is, when the skin is tender, better than a rag or towel; but a sponge must be *well cleansed* every time, with soap and hot water, to be used again. Dusting with a little "pat" filled with fine starch or arrow-root powder is very soothing and protective.

When the skin has become sore about the thighs, the child will show it by a sharp cry on wetting itself. Redness also, as well as tenderness to the touch, will be found on examining it. Then *tallow, cold cream* (of the apothecary), or *oxide of zinc ointment*, should be applied gently every night and morning (or oftener if need be) after changing it. The worst cases, such as come only from considerable neglect, may need to be treated like burns, with soft rags, wet with lime-water and sweet oil (equal parts, mixed), and covered with oiled silk.

Babies, as well as adults, should have the head kept cool, and the

feet warm. Out of doors, a cap is all right—thick or light according to the season; but there is no need of any cap being worn in the house. They are better without it.

A frequent trouble is with the bed-covers at night. First, never forget that covering *makes no warmth* of itself. It only *keeps* (by non-conduction) what warmth the body has of its own. So, if a baby is put cold into a cold bed, especially if it be sick, it may scarcely get warm all night. In that case the bed-clothing should be *warmed* first; by passing a hot flat-iron under and over it; or, for an ill baby, keeping a warm brick or bottle or tin of hot water in the bed while needed.

Restless children will often fling and kick the bed-covers all off at night; and this exposes them to taking cold. Watching them all night is hard service. Much better will be the canton-flannel night-gown, *sewn up tight* (like mittens) at the ends of the hands and feet. If they do throw everything else off, this will keep them still pretty warm.

Must infants always wear flannel in the daytime? Delicate ones certainly should, in our climate; thick (though soft) flannel in winter, and light flannel in summer time. When an infant shows itself, at two or three years of age, to be hardy, its *summer* flannel may be left off safely. *Silk*, or merino, will do for all but weakly children.

BATHING.

A new-born child should be bathed only in *warm* water, in a warm room. From 95° to 90° should be the temperature of its bath; the thermometer had better be used, as the touch is so uncertain.* As it gets older, at least if it seems "hearty," the water may be allowed gradually to go down to 85°; or, in warm weather, even 80°. The best *test* of its not being too cool is, the infant being rosy and merry *after* the bath. A child should *like* its bath, if it is rightly managed; never startling it with a sudden plunge, but accustoming it to it by degrees. A mother had better bathe her own baby, if she is well and strong enough to do so.

One error especially to be avoided is, letting a child, once wet all over, sit *half in* and *half out* of the water; being thus chilled by evaporation from the uncovered part of the body. A little patient of mine, just

* Some intelligence, also, is here wanted. Once, when my baby was to be bathed, its mother sent the nurse with the thermometer to see whether the *room* was warm enough. She came back in about five minutes, saying that at first it was too cold, but after she had *put the thermometer to the fire awhile*, it got quite warm!

getting well after scarlet fever, lost his life through this kind of imprudence on the part of a nurse.

During our *hottest* weather, when the thermometer ranges between 95° and 100°, even a young infant may profit by a *cool* bath, say at 75° or 70°; but then it must be a *short-time* bath also. The cooler, the shorter the time of immersion.

Much soap does not need to be used in bathing infants. If the child be bathed daily, it needs (after its *first* thorough cleansing) only an occasional employment, unless about the thighs, of a little of the best castile soap. *Salt* may be added to the bath if the child is weakly, for its tonic effect. In *sickness, warm* or *hot* baths may be of great service; but our account of the use of such belongs in another place.

EXERCISE.

After the first few months, a babe should be allowed and encouraged to *sprawl;* first on a wide bed, being watched that it does not fall off; afterwards on a carpeted floor, or a rug. This will spread its chest, and bring most of its muscles into play. Thus it will gain strength, and get ready, in due time (*don't hurry it*) to stand up and walk. Crawling comes first, according to the true nature of bodily development.

AIRING.

Very soon every baby ought to begin to be taken out in fine weather. In summer, no matter how soon; in winter, it requires care about keeping it warm, of course. But quite young infants may be, with proper out-of-door clothing, accustomed to being taken out into the sunshine and air every fine day.

A nursery ought to be always a *sunny* and *well-aired* room. As already said, infants suffer more harm from *bad air* than grown people do. Scarlet fever, measles, whooping-cough, diphtheria, and all other diseases are commonly *worst*, killing the most children, in tenement-houses (like those of New York and Boston); and, elsewhere, in crowded alleys, where people live too close together and do not have fresh, pure air to breathe.

SLEEP.

For the first month or two, an infant naturally sleeps more than half its time. All through the first year, many babies sleep from twelve to sixteen hours in the twenty-four. It is a grand thing for all concerned when the little one can be trained early to sleep *most of the night.* Habit may be formed, in such matters, very soon. On this something was said when we were considering the *feeding* of babies.

Lay the child down to sleep, from the start; do not get it used to being carried about to go to sleep in somebody's arms. Put it to sleep in its crib *alone*, as a rule. Hard to believe as it seems, some weary slumbrous mothers have *overlain* their babies; that is, rolled upon them while asleep and suffocated them. Moreover, the vapors from another human body make the bed less wholesome for the child. Yet, with a *wide* bed, convenience may sometimes afford reason for a child being laid beside, but not too near, its mother or nurse.

Never rock a child in a cradle. This has, happily, quite gone out of fashion. If it has any effect, it is by causing a kind of dizziness (like seasickness) which cannot be good for the child.

Let the baby soon get used to going to sleep in the dark. Otherwise, when it gets older, it will be afraid to do so, with a fear often very hard to overcome.

Put *no curtains* about a bed, for child or grown person. Bed-curtains were an absurdity of an almost inexcusable kind. It is hard to get enough pure air into a sleeping chamber; let alone inside of a closely curtained bed. If we slept out of doors, as men do in camps, we ought to cover our bodies warmly; and bald people, their heads; but even then, our *faces* ought to be out, anywhere at least short of the neighborhood of the North or South Pole.

Most babies, when they do sleep well early in the night, wake very early in the morning, and then want food. Before noon they are apt to be ready to take a nap of two or three hours. Some will also want an afternoon nap of an hour or two. Let them sleep all they will; sleep and grow fat. Never wake a young child (or indeed an older one) suddenly; it jars their brains. When their sleep is out they will wake up of themselves.

DISCHARGES.

Every mother ought to know that it is natural for infants to have two, three, or four passages from the bowels every twenty-four hours, when perfectly well. In the first month or two the discharge is more or less fluid; afterwards it becomes more nearly solid, but always softer than later in life; of a brown color when nothing is the matter. A *sick* child may have the stools slate-colored, yellow, green, black, curdy, slimy, or bloody; all of which changes are important, and will be noticed in the medical part of our work hereafter. (See page 508.)

Water is passed from the *kidneys* of an infant several times during each twenty-four hours. If that is *not* the case, something is wrong, and requires attention. Warming the water of its bath more than usual is a suitable measure at such a time; and giving sweet sp. of nitre, 3 or 4 drops at once, in a teaspoonful or more of water.

TEETHING.

Mothers and nurses ought to know what to look for in their babies' mouths, as the months follow each other in their first two years.

Only **twenty** teeth, be it remembered, come in the first set, or "milk teeth." **Thirty-two** follow these, and take their place, in the second set.

About the end of the *sixth* month (from the fifth to the eighth), it is common for the two *lower middle front* teeth to appear through the gum; and not long after, even sometimes before these, the two *upper middle* front ones. These are called *cutting* or **incisor** teeth. So are the next to come out—alongside of the first—the **lateral** incisors (side cutting teeth), below and above; which appear between the *eighth* and the *tenth* months. Before the infant is a year old, then, it usually has at least its *eight front teeth* out: four below and four above.

Next, we might expect those nearest these to appear; but they do not. Instead come the *first jaw* or **molar** teeth: two below and two above; between the *twelfth* and the *fourteenth* months.

Then follow, between the *fourteenth* and *twentieth* months, the *stomach* and eye teeth, as people call them; the four **canine** teeth, two below and two above; pointed teeth.

After these, and last of the first set, come the *second jaw* or **molar** teeth: two below and two above; between the *eighteenth* and the *thirty-sixth* months. In *each* jaw, in all, there are then **four incisors,**

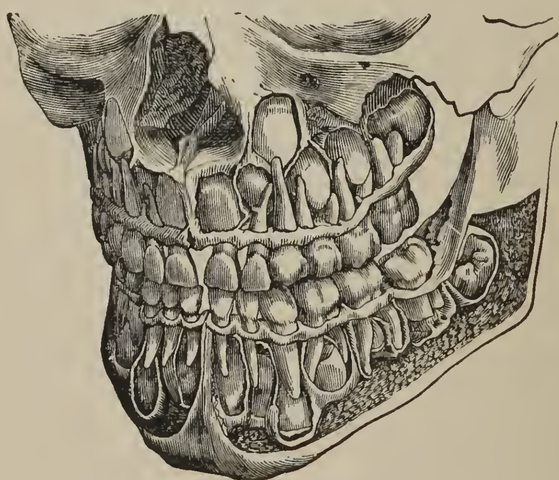
two canines, and **four molar** teeth; doubling these, we get the twenty of the whole set. The following diagram shows this, with the order of their succession:

5	3	4	2	1	1	2	4	3	5
M	M	C	I	I	I	I	C	M	M
M	M	C	I	I	I	I	C	M	M
5	3	4	2	1	1	2	4	3	5

I stands for *Incisor;* C for *Canine;* M for *Molar.*

This order is the *general* mode of succession; but variations from it are far from rare. Often the upper teeth, front and all, come before

Fig. 172.



DEVELOPMENT OF TEETH.

the lower ones. The *time* for each group of teeth is frequently later, and sometimes earlier, than that above mentioned. Last week, for example, I was told of a baby which has *four* front teeth out at five months; and I once had under my care an Irish child which was *born* with two upper teeth. Historians tell the same thing of Julius Cæsar.

As the time comes near (about the sixth or seventh *year*) for the **second dentition,** the new set, whose germs were *in the jaws at birth,* grow steadily larger in the gums. The milk-teeth are *not forced* out; but, under the wonderful natural adaptation of parts, their fangs are gradually *absorbed,* and thus they loosen and drop out, or are easily taken out, and make way for the second set of **permanent** teeth. (How often *not very* permanent in our country, all the dentists know.)

These are thirty-two in number (see **Anatomy**). The first to come through the gums are the **first molar** or jaw teeth. Next, at about seven years of age, the **middle incisors**; then the **lateral incisors**, at or near the end of the eighth year. After these, the **first premolars** (bicuspids) or lesser jaw teeth; and in the ninth year, the **second premolars.** Between eleven and twelve years, the permanent **canines,** two above and two below. From twelve to thirteen or fourteen years, the **second molars**; and from seventeen to twenty-one years, the **last molars,** or *wisdom teeth.* These last are often imperfect from the start.

Occasionally, even the second teething is attended by soreness and irritability of the mouth, nervousness, etc. But very often it would pass almost unnoticed, except for the "bother" of getting rid of the loosening first teeth, as the others come. The really *trying* teething time is with the first set of teeth; from the sixth month to about the end of the second year of infancy.

Dentition is a process of *growth.* A great deal of blood is needed in the tissues of the jaws for this purpose. Moreover, for the teeth to "come out," the *gums* must *give way,* by absorption. Should this be slow, a *tension* of the gum may occur; and, through the nerves, the whole system may be brought into sympathetic excitement. As the nervous apparatus is much more *irritable,* more easily *disturbed,* in babyhood than in adult life—we often have, from this cause, worrying; fretfulness; sometimes fits, or *convulsions.* A child which was "always good" before, now may cry a great deal, losing its reputation for goodness altogether.

A word here about babies' crying. A *healthy* child, not teething, *if well taken care of, will very seldom cry.* Some mothers and nurses will not admit this; but from a good deal of observation I insist upon it. Mark, I say a healthy child, well taken care of. If a child's wants, namely, food, warmth, sleep, and timely changing, are duly attended to, why should it cry? But if it becomes very hungry, and is not nourished, or is cold, or too warm, or is left with garments soiled and wet, *of course* it cries. And, the *habit* once formed, cry it will, though the whole household and neighborhood regard it as a "crying evil."

Several sorts of crying may be observed, which it is desirable to understand. First there is the cry of **surprise,** on the child being first ushered into the world. That is all right and natural.

> "On mother's knees, a naked, new-born child,
> Thou only wept, while all around thee smiled.
> So live, that, sinking in thy last long sleep,
> Thou then may'st smile, while all around thee weep."

Next, comes the *calling* cry, of hunger, thirst, or other *want.* Sharper and shriller, sometimes a violent *scream,* is the cry of *pain;* as of colic or earache; or of fright, as when a babe rolls out of its bed or crib upon the floor. Much like the cry of simple want, but habitually harsher in manner, is that of *demand* or *command,* of a child already *spoiled;* finding that *whatever it cries for it will get.* An aggravation only of this, is the (sometimes fairly impish) roar and succession of screams, of *temper* and *passion.* *Disease* has various cries; according to its character. Sometimes it is only a faint moan, attending nearly every breath. Other times it is hoarse, as in croup; along with a short, barking cough. Or it may be the wild scream of inflammation of the brain. Of these, which are *symptoms* of diseases, more in another place.

Teething is not a disease, a morbid process, at all. But it is an important change, which for the time renders the child more than before or after *liable* to disorders, under any disturbing causes; and the process of penetration of the gums by the young teeth *may* sometimes itself be imperfectly accomplished. The most common and least alarming effect of the "sympathetic irritation" of teething is *diarrhœa.* This seems often to give a *safe vent* and relief to the disturbance of the system. Three or four, or even five moderately free passages from the bowels daily, at such times, are not objectionable; are much better than constipation. *Convulsions* are frightful to behold, and attended by danger. Of these we will speak in the medical part of this work.

Here, however, it may be suitable to refer briefly to *lancing the gums.* Once, this practice was universal; every babe had its gums cut almost every time that a new tooth was about to appear, whether it gave much trouble or not. From this (as with bleeding from the arm, and some other old methods of practice) there has come to be a reaction, and some physicians never lance infants' gums at all. Having been brought up and beginning practice under the old *régime,* I have seen enough to convince me fully that extremes are not right here, more than elsewhere. Healthy babies may often pass through their teething without needing to have their gums lanced. But *some* may be, by this simple and harmless means, kept from having convulsions, which, if brought on, may threaten their lives. I call lancing the gums harmless, because it should be and always may be so. Use a *clean,* sharp lancet, and divide the gum with a straight, firm cut; in the direction of the edge if it be an incisor, and across the crown if a molar tooth; and then there will never be any "scars" or other trouble. Perhaps once or twice in a century, in America or Europe, a child may be found which is naturally a "bleeder,"* so that the smallest cut will hardly be safe.

* *Hæmophilia* of medical language.

If so, such a tendency must be a family trait, already well known and to be remembered.

My belief is that it is well to lance the gums whenever they are much *swollen, red,* painful, and *worrying,* to the child, making it nervous and hard to get to sleep; or when, even though not swollen, the tooth is evidently not far within the gum, which seems tense, and a source of irritation, calling for relief. Many a child, once helped by this measure, will ask for it, with looks if it has no words (as I have seen) to have it repeated.

A lesser, but not unimportant means of relief for worriment of the mouth during teething, is the use of rubber rings, bits of ivory, etc., smooth and firm, but too large to swallow, for the child to bite upon. When there is much heat of the mouth, a soft rag filled with pounded ice will, in summer time, do the most good.

At no time is it more needful than during dentition, to be very careful about the *food* which the child takes. Indigestion is a very common exciting cause of convulsions.

SUMMER DANGERS.

In our American cities, *hot weather* kills more young children than any other cause. Look at the weekly record of deaths in New York or Philadelphia, and you will find that every degree of noon temperature above 95° costs scores if not hundreds of little lives. In those cities, about one-half of the deaths of children in the first year of life, and nearly one-third of those in the second year, take place in June, July, and August.

High heat, crowding, filth, and *unsuitable food,* conspire against children in the summer homes of the city poor. But the rich may suffer also, from *excessive heat, town air,* and *improper diet,* for their children; and these causes produce many cases of *summer complaint,* or "cholera infantum."

Whoever, of our city families, can take their infants out into the *country,* during their first, second, and third summers, for the months of June, July, August, and September, ought to do it. With those who cannot, the next best thing is to take or send them out on frequent *excursions,* on land or water, and to have them often in the open *parks or squares;* for as much *pure, cool* air as they can get. It is the best preventive, and often the best curative, of summer complaint.

For those who are obliged to live in the crowded parts of towns or

villages, the rules given by the Obstetrical Society of Philadelphia "for the management of infants during the hot season" have proved serviceable. I will quote them here, in addition to what has been already said on our previous pages on the same subjects.

Rule 1.—Bathe the child once a day in tepid water. If it is feeble, sponge it all over once a day with tepid water, or with tepid water and vinegar. The health of a child depends much upon its cleanliness.

Rule 2.—Avoid all tight bandaging. Make the clothing light and cool, and so loose that the child may have free play for its limbs. At night undress it, sponge it, and put on a slip. In the morning remove the slip and dress the child in clean clothes. If this cannot be afforded, thoroughly air the day-clothing by hanging it up during the night. Use clean diapers, and change them often. Never dry a soiled one in the nursery or in the sitting-room, and never use one for a second time without first washing it.

Rule 3.—The child should sleep by itself in a cot or cradle. It should be put to bed at regular hours, and be early taught to go to sleep without being nursed in the arms. Without the advice of a physician, never give it any *spirits, cordials, carminatives, soothing-syrups, or sleeping-drops. Thousands of children die every year from the use of these poisons.* If the child frets and does not sleep, it is either hungry or ill. If ill, it needs a physician. Never quiet it by candy or cake; they are the common causes of diarrhœa and of other troubles.

Rule 4.—Give the child plenty of fresh air. In the cool of the morning and evening send it out to the shady sides of broad streets, to the public squares, or to the Park. Make frequent excursions on the rivers. Whenever it seems to suffer from the heat, let it drink freely of ice-water. Keep it out of the room in which washing or cooking is going on. It is excessive heat that destroys the lives of young infants.

Rule 5.—Keep your house sweet and clean, cool and well aired. In very hot weather let the windows be open day and night. Do your cooking in the yard, in a shed, in the garret, or in an upper room. Whitewash the walls every spring, and see that the cellar is clear of all rubbish. Let no slops collect to poison the air. Correct all foul smells by pouring carbolic acid or quicklime into the sinks and privies. The former article can be got from the nearest druggist, who will give the needful directions for its use. Make every effort yourself, and urge your neighbors, to keep the gutters of your street or court clean.

Rule 6.—*Breast-milk is the only proper food for infants.* If the supply is ample, and the child thrives on it, no other kind of food should be given while the hot weather lasts. If the mother has not

enough, she must not wean the child, but give it, besides the breast, goat's or cow's milk, as prepared under Rule 8. Nurse the child once in two or three hours during the day, and as seldom as possible during the night. Always remove the child from the breast as soon as it has fallen asleep. Avoid giving the breast when you are over-fatigued or overheated.

Rule 7.—If, unfortunately, the child must be brought up by hand, it should be fed on a milk-diet alone, and that, warm milk out of a nursing-bottle, as directed under Rule 8. Goat's milk is the best, and next to it, cow's milk. If the child thrives on this diet, *no other kind of food whatever should be given while the hot weather lasts.* At all seasons of the year, but especially in summer, there is no safe substitute for milk to an infant that has not cut its front teeth. *Sago, arrow-root, potatoes, corn-flour, crackers, bread, every patented food, and every article of diet containing starch, cannot and must not be depended on as food for very young infants.* Creeping or walking children must not be allowed to pick up unwholesome food.

Rule 8.—Each bottleful of milk should be sweetened by a small lump of loaf-sugar, or by half a teaspoonful of crushed sugar. If the milk is known to be pure, it may have one-fourth part of hot water added to it; but, if it is not known to be pure, no water need be added. When the heat of the weather is great, the milk may be given quite cold. Be sure that the milk is unskimmed; have it as fresh as possible, and brought very early in the morning. Before using the pans into which it is to be poured, always scald them with boiling suds. In very hot weather, boil the milk as soon as it comes, and at once put away the vessels holding it in the coolest place in the house—upon ice if it can be afforded, or down a well. Milk carelessly allowed to stand in a warm room soon spoils, and becomes unfit for food.

Rule 9.—If the milk should disagree, a tablespoonful of lime-water may be added to each bottleful. Whenever pure milk cannot be got, try the condensed milk, which often answers admirably. It is sold by all the leading druggists and grocers, and may be prepared by adding, without sugar, one teaspoonful, or more, according to the age of the child, to six tablespoonfuls of boiling water. Should this disagree, a teaspoonful of arrow-root, of sago, or of corn-starch to the pint of milk may be cautiously tried. If milk in any shape cannot be digested, try, for a few days, pure cream diluted with three-fourths or three-fifths of water—returning to the milk as soon as possible.

Rule 10.—The nursing-bottle must be kept perfectly clean; otherwise the milk will turn sour, and the child will be made ill. After each meal it should be emptied, rinsed out, taken apart, and the tube, cork,

nipple, and bottle be placed in clean water, or in water to which a little soda has been added. It is a good plan to have two nursing-bottles, and to use them by turns.

Rule 11.—Do not wean the child just before or during the hot weather, nor, as a rule, until after its second summer. If suckling disagrees with the mother, she must not wean the child, but feed it in part, out of a nursing-bottle, on such food as has been directed. However small the supply of breast-milk, provided it agrees with the child, the mother should carefully keep it up against sickness: it alone will often save the life of a child when everything else fails. When the child is over six months old, the mother may save her strength by giving it one or two meals a day of stale bread and milk, which should be pressed through a sieve and put into a nursing-bottle. When from eight months to a year old, it may have also one meal a day of the yolk of a fresh and rare-boiled egg, or one of beef- or mutton-broth into which stale bread has been crumbled. When older than this, it can have a little meat finely minced; but even then milk should be its principal food, and not such food as grown people eat.

CONSTIPATION OF THE BOWELS IN CHILDREN.

When an infant's bowels do not act, at least once or twice, freely, every day, *sweet* (olive) *oil* may be given, a teaspoonful at once; or *manna*, a quarter of a teaspoonful at a time (it is sweet and easily taken); or *simple syrup of rhubarb*, a teaspoonful at once; or *glycerin*, a teaspoonful at a time. If the stomach is sick at the same time, *magnesia* (Husband's or Henry's is best) may do more good, a quarter or half a teaspoonful, according to the age of the child, stirred well up in a little water. If colic is present, *castor oil*, a teaspoonful mixed with two teaspoonfuls of *spiced syrup of rhubarb* will be the best thing to open the bowels.

VITAL STATISTICS.

In a book like the present, it is appropriate to occupy but a small space with a general view of this subject, whose full consideration would require a large volume. Exact and certain statements, moreover, are not yet to be obtained upon it; a great deal is more or less conjectural. Still, the experience of those who make a study of statistics renders the results gathered by them of value towards understanding the *causes of disease,* and thus improving the means of preventing diseases and prolonging human life.

Our present purpose will be best served by a summary account of the main facts.

Approximate Statistics.

Population of the World, 1,475,000,000.

Population of the United States, 60,000,000.

Most Populous Regions, Egypt, China, Belgium, England.

Marriages in Europe, 15 to 1000 inhabitants, annually.

Marriages in United States, 17 to 1000 inhabitants, annually.

Births to each Marriage, Europe, 5; France, 3; United States, 4.

Births to Population, Europe and America, 1 in 30.

Sexes: 9362 Females born to 10,000 Males.

9190 Females die to 10,000 Males.

Deaths to Population, yearly, United States, 1 in 45.

Deaths to Population, yearly, Census of 1880, 18 in 1000.

Lowest Annual Mortality anywhere, 15 in 1000.

Lowest Annual Mortality to be expected in a healthy locality, 17 in 1000.

Average age at death in United States, 35 to 40 years.

Average age at death the world over, 33 to 35 years.

Average age at death in England and Scotland, 41 years.

Average number of cases of sickness for each death, 25.

In regard to different classes of people, the modes of living, work, and surrounding circumstances, make a great difference; although those who live very long are found, now and then, under the most varied conditions.

Of 112 peers in Great Britain the average age at death was sixty-seven.* At Berlin, the mean term of life in the upper classes, according to Casper, is fifty years; of the poorer residents of the same city,

* The same was the average age of the clergymen of the Church of England who died in 1869.

thirty-two years. The Friendly Societies in England have found their members to average forty-three and three-quarter years; these being, however, usually persons who take more than average care of themselves. The following table (Wynne) is taken from statistics of the State of Massachusetts.

Average Longevity of Men.

Judges	62 to 67	years.
Paupers	65.19	"
Gentlemen (of leisure)	62 to 64	"
Bank Officers	61.75	"
Millers	61.5	"
Clergymen	56.25 to 56.5	"
Lawyers	56.5	"
Physicians	55 to 55.75	"
Hatters	55	"
Farmers*	47 to 64	"
Merchants	52	"
Artisans	40 to 44	"
Clerks	33.75	"
Laborers	34	"
Railway Conductors	37	"
Brakesmen	27	"
Flint Makers	19	"

Women.

Nurses	54.6	years.
Housekeepers	51	"
Shoebinders	45.5	"
Domestics	44	"
Seamstresses	41.8	"
Tailoresses	40.5	"
Milliners	35.5	"
Dressmakers	32.33	"
Straw-braiders	35	"
Teachers	28	"
Day-workers	27.7	"

There must be some important omissions in this last table. "Ladies" who do not have to support themselves are not mentioned. Teachers are

* According to the Massachusetts Report for 1864, farmers averaged more than sixty-four years of life.

not now (however they may have been formerly) often worked to death by the end of their twenty-eighth year. Moreover, among persons known to have lived to be ninety or one hundred years old, there are more women than men. The main worth of such averages is *relative;* that is, to show the *general* difference in the probability of life among those of different avocations and modes of living.

According to the English census returns, Neilson finds the mortality in various occupations to be as follows:

MORTALITY PER 1000 PERSONS LIVING.

	DEATHS TO THE 1000.
Church of England clergy	10.02
Nonconformist clergy	10.01
Roman Catholic clergy	15.7
Physicians	12.6
Surgeons and Apothecaries	18.7
Barristers-at-law	10.9
Attorneys	16.2
Provision-curers	16.8
Butchers	17.4
Poulterers	21.1
Fishmongers	17.4
Iron miners	13.7
Coal miners	14.8
Tin miners	16.1
Lead miners	20.3
Copper miners	24.7
Iron manufacturers	12.7
Paper "	13.0
Tin "	13.1
Nail "	13.2
Brass "	13.8
Glass "	15.8
Copper "	18.5
Lead "	19.3
Earthenware	19.7
Blacksmiths	13.8
Whitesmiths	16.8
Coppersmiths	17.1
Plumbers	18.3
Railway officers	12.8
" laborers	14.2

MORTALITY PER 1000 PERSONS LIVING—(*Continued*).

	DEATHS TO THE 1000.
Railway porters	15.2
Engine drivers	16.3
Domestic gardeners	7.9
" grooms	9.8
" coachmen	14.7
" general servants	13.6
Beer-sellers	20.6
Wine merchants	23.3
Licensed spirit retailers	23.9
Inn and hotel keepers	26.8

Among the curiosities of vital statistics (not without partial explanation, however) are some referring to the Jewish race now in Europe. From a recently published statement, it appears that the average life of the Jew in London is forty-nine years, while of the Christian it is only thirty-seven years. Of a given number of Christians, only one-quarter will, as a general rule, live to be sixty years, while among Jews one-quarter live to be at least seventy-one. Among children, fourteen per cent. of the Christian population die between one year and five years of age, while only ten per cent. of the Jewish children do so. In Prussia it requires fifty-one years for the Christian population to double itself, and only forty-one years for the Jewish.

Other facts concern the ages at which people marry. The greatest number of marriages for men take place between the ages of twenty and twenty-five in England, between twenty-five and thirty in France, and between twenty-five and thirty-five in Italy and Belgium. Finally, in Hungary, the number of individuals who marry is seventy-two in a thousand each year; in England it is sixty-four; in Denmark, fifty-nine; in France, fifty-seven, the city of Paris showing fifty-three; in the Netherlands, fifty-three; in Belgium, forty-three; in Norway, thirty-six. Widowers indulge in second marriages three or four times as often as widows. For example, in England there are sixty marriages of widowers against twenty-one of widows; in Belgium there are forty-eight to sixteen; in France, forty to twelve. In New York State, in 1865, there were 196,802 families without children.

I have not at hand any reliable estimate of the ages at which marriages occur in this country. Probably the greatest number by far take place between twenty and thirty years. In Oriental countries, women are often made wives at twelve or thirteen years; in India they are given away by their parents as betrothed at still earlier ages.

The *numbers of the sexes*, in our Eastern and Western States, differ remarkably. In 1860, in California, there were three men to one woman; in Nevada, eight, and Colorado, twenty. In New England, there are about 60,000 more women than men.

Again, the variations in *stature* in our large country are interesting. We have no very reliable statistics on this point except those taken during the civil war, recorded by Dr. B. A. Gould, in regard to the height of men in the United States army.

Iowa sent the tallest men into the army, the average height of her troops being 69 inches. The lowest average was in the soldiers of New Jersey, 66.7. Maine, Vermont, Ohio, Indiana, Minnesota, and Missouri volunteers were over 68 inches. New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, Michigan, Wisconsin, and Louisiana recruits were over 67 inches. The average of the whole million of men was 68 inches, or five feet eight. There were individual cases of much greater height, one individual of six feet ten inches being in the army, and several hundred men over six feet four inches.

The sailors turned out invariably to be shorter in stature than the soldiers. From New York they only showed an average of 65.8 inches; from Missouri, 66 inches. Generally the sailors, it may be said, are little fellows—little but strong.

Relative Proportion of the Height and Weight of the Human Frame.

Height.	Weight.	Med. Chest.
4 feet 10 inches	105 pounds	32.56 inches.
4 " 11 "	110 "	33.06 "
5 " 0 "	115 "	33.56 "
5 " 1 "	120 "	34.06 "
5 " 2 "	125 "	35.13 "
5 " 3 "	130 "	35.70 "
5 " 4 "	135 "	36.26 "
5 " 5 "	140 "	36.83 "
5 " 6 "	143 "	37.50 "
5 " 7 "	145 "	38.16 "
5 " 8 "	148 "	38.53 "
5 " 9 "	155 "	39.10 "
5 " 10 "	160 "	39.66 "
5 " 11 "	165 "	40.23 "
6 " 0 "	170 "	40.80 "
6 " 1 "	175 "	41.30 "
6 " 2 "	180 "	41.80 "
6 " 3 "	185 "	42.30 "
6 " 4 "	190 "	42.80 "

Quetelet, who has devoted more attention to this subject than any other writer, gives the average weight of an adult male 136.993 pounds, and the average height 5.333 feet.

Dr. Gould, who examined a large number of students in the junior and senior classes at Harvard University and Yale College, together with some members of the professional schools, reports their average height 5.666 feet, and average weight 139.700 pounds. A. Maclaren, who has charge of the gymnasium connected with the Oxford University, England, reports of the first one hundred names on his book, as they arrived at the University, their average height 5.825 feet, and average weight 132.970 pounds.

From the vital statistics of all the members of Amherst College from 1861 to 1869 — making over 600 different students — their average weight was found to be 139.485 pounds, and average height 5.651 feet.

Comparative mortality in cities varies much from year to year, especially when epidemics prevail, as cholera, or yellow fever, or even diphtheria, typhoid or typhus fever, or (from *neglect of vaccination**) small-pox.

This variation may be easily seen by glancing at the following tables:

MORTALITY IN 1870.

Philadelphia, deaths per 1000		22.72
New York,	"	28.8
St. Louis,	"	21.3
Chicago,	"	24.5
Baltimore,	"	25.65
Boston,	"	24.33
Cincinnati,	"	18.39
New Orleans,	"	36.34
San Francisco,	"	21.57
Washington,	"	16.80
Montreal,	"	31.3
London,	"	24
Vienna,	"	29.8
Liverpool,	"	31.1
Edinburgh,	"	26.3

1872.

Philadelphia, deaths per 1000		26.1
New York,	"	32.6

* Every child born into the world should be *vaccinated*, when three or four months old; or sooner if exposed to small-pox; and *revaccinated* when fourteen or fifteen years old, to test and confirm its protection from the contagion.

San Francisco, deaths per 1000	17.2
Memphis, "	46.6
London, "	22.7
Dublin, "	29.9
Paris, "	24.4
Berlin, "	29.9
Vienna, "	31.8
Prague, "	48.9
Turin, "	30.4
Christiana, "	20.7
Florence, "	31.6
Rome, "	36.7
Bombay, "	29.2
Madras, "	35.

1873.

Philadelphia, deaths per 1000	20.29
New York, "	27.96
Boston, "	28.45
Richmond, "	33.39
New Orleans, "	37.5
St. Louis, "	19.
Brooklyn, "	25.19
Baltimore, "	29.96
Cincinnati, "	22.84
San Francisco, "	17.2
Memphis, "	40.6
London, "	22.4
Paris, "	23.2
Bombay, "	24.2
Valparaiso, "	66.9

First Quarter of 1883.

London, deaths per 1000	22.1
Paris, "	27.3
Brussels, "	25.7
Stockholm, "	27.8
Vienna, "	31.1
Madrid, "	36.4
St. Petersburgh, "	40.6

The mortality rate of Philadelphia in 1881 was 22.41 in 1000; in 1882, 22.62 in 1000 of population.

The following extract from a leading English periodical shows one of many interesting lines of inquiry on this topic:

"*Vital Statistics of France and Prussia.*—A considerable sensation has been caused this week in France by the communication of M. Decaisne to the Academy of Medicine of an important study on the depopulation of France, indicated by its present vital statistics. Comparing it with Prussia, he shows that there 100 marriages produce 460 children, while in France they give only 300. The percentage of births to population in Prussia is 3.98; in France, only 2.55. The annual excess of births over deaths in Prussia is 13,300 per million; in France, 2400. As to the future, the French population would require one hundred and seventy years to double itself; that of Prussia, only forty-two; that of Great Britain, fifty-two; that of Russia, sixty years."—*Brit. Med. Journ.*, June 15, 1872.

It is interesting also to note that the diminishing number of births seems not to be confined to the cities, but is characteristic of the rural districts as well. Since 1801 the rate of births per 1000 inhabitants has fallen in the Pyrénées-Orientales from 44 to 32; in Rhône from 36 to 26; in Tarn from 34 to 25; in Indre from 37 to 27; and in La Creuse from 33 to 23. While in Germany the average number of children per marriage is 5.25; and in England 4.79; in France it is only 3.31. The total rate of births among the French is 26 per thousand; while in England it is 35; in Austria 38; in Prussia 38.5; in Saxony 40; and in Russia 50.

On infantile mortality, I take the following paragraphs from a paper read by myself before the American Public Health Association, several years ago, in Philadelphia:

It is, in my belief, a justifiable opinion that amongst those born with a normal constitution, and under entirely favorable circumstances, the mortality during infancy and childhood *ought* to be *less* than at any other period of life. Yet it is a fact familiar to every one, that the reverse is the case in very many localities; most notably in large cities. In France, according to Bouchut, one-sixth of all born die in the first year of life (Bertillon recently puts it at one-fifth); in Sweden and Finland, one-fifth; in Berlin, Prussia, one-third. Nor is the proportion very much less in some parts of England and this country. Before the war it was worst of all in New Orleans. In 1872, 1 death in 4½ occurred under one year of age in that city.

In New York, in 1868, as reported by the Metropolitan Board of Health, more than one-fourth of the total mortality was of children under one year of age; while in *certain districts* of that city eighty per cent. of the whole mortality occurred during childhood. In 1872, con-

siderably more than one in four of the deaths in New York occurred in children one year old or under. Philadelphia suffered last year (1883) a total mortality of 16,736 deaths at all ages, of which 5121 were under one year of age; and 7151, about 1 in $2\frac{1}{3}$ of all deaths, under five years. Yet this was below the infantile mortality of our city for the four previous years. Boston, in ten years (1861–70), lost within the first year $5\frac{1}{4}$ of all born. San Francisco, in 1871, had one death under one year, or about $4\frac{1}{3}$ of all deaths. Looking back through considerable periods, we find that in 1810, in New York, one-half of all deaths took place in persons twenty-four years old or upwards; in 1857 one-half of the deaths were of children not more than two years old. In Philadelphia, in 1807, half of the deaths occurred after twenty-four years of age; in 1856 one-half were of children less than four years old. These last figures show an *increase* of mortality, relatively at least, amongst children. Dr. Farr has shown that in London it has been otherwise. About the middle of the eighteenth century seventy-five per cent. of the deaths were of children under five years of age; at the beginning of the nineteenth century about fifty per cent.; and now about twenty-nine per cent. have fallen within the same period of life. The rate is declining somewhat during the last few years in Philadelphia and New York. From 1860 to 1872, the deaths under five years were 44.78 per cent., and under one year 27.25 per cent., of the total mortality of Philadelphia.

In England, Dr. Farr proves by his reports to the Registrar-General, that the diseases of childhood are *twice* as fatal in towns as in the country. Other interesting points are, as to the season of greatest mortality of children in our great cities, and the nature of the most destructive maladies. As Dr. Elisha Harris has remarked, summer is the *tentator infantum* in New York. In the summer quarter of 1868 in that city, the whole number of deaths being somewhat less than 8700; of these nearly 5600 were of children under five years of age; almost all being from what are called "diarrhœal diseases." During one hot week of the summer of 1870, three-fifths of the aggregate mortality in New York (645 deaths out of 1048) occurred in children under five years: 400 deaths being from cholera infantum alone. In the hottest week of 1872, in Philadelphia, 852 deaths occurred; of which 497 were of infants under two years, 383 under one year; mostly from diarrhœal disorders. The week previous to this gave 1569 for the total mortality of New York, increased largely by the same mode of causation, such an aggregate of deaths probably having never been exceeded in that city; as the former (852) never has been in Philadelphia.

But the excessive mortality of early life is by no means accounted

for by seasonal influences alone; other causes, also, are of great importance.

The *Medical News* (Philadelphia, 1883) has the following paragraph: "THE ENORMOUS MORTALITY OF COLORED INFANTS.—One point of highest importance brought out by Dr. Billings is the small expectation of life of the colored population of our cities, as shown by tables compiled for the first time, we believe, under his direction. From these it appears that of 1,000,000 colored infants born in Baltimore, one-half will have perished before attaining the age of two years. A similar mortality prevails in other cities where the colored population is large. When it is remembered that of an equal number of white children born in Baltimore, one-half will live thirty-five years, the disproportion becomes startling, and makes imperative a close investigation into the causes, conditions, and remedies for this lamentable state of affairs. Another interesting feature of these tables is the disproportionately greater number of aged colored females than of males. Of the colored males, there will be left at sixty-five years, 57,252; of females, 93,171; of males at seventy-five years, 19,440; of females, 56,283; of males at eighty-five years, 2929; of females, 12,726; of males at ninety-five years, 315; of females, 1477; while 75 males and 158 females will attain one hundred years of age. As will be seen, these figures show rather a remarkably short duration of life of colored men than of longevity of colored women, who appear to be much shorter-lived than their white sisters."

In regard to the **causes** of deaths, the London *Echo* quotes as follows from official statements: "Taking an average for the thirty-three years, 1838–70, we find that the number of deaths in England to every 1000 of the population is 22.4. Of course, the death-rate varies with each year, the figures ranging from 20.5 in 1856 to 25.1 in 1849, when the cholera visited us with fearful severity, destroying no fewer than 53,273 lives—13,161 in London alone, and in little more than three months. The twelve most fatal causes are as follow, the figures attached showing the number of deaths due to each disease in 1870: phthisis (consumption), 54,231; bronchitis, 46,699; scarlet fever, 32,543; atrophy and debility, 30,530; old age, 28,889; convulsions, 26,548; diarrhœa, 25,311; heart-disease, 23,957; pneumonia, 23,729; whooping-cough, 11,901; paralysis, 11,651; and apoplexy, 11,598."

War (public and private) and accidents apart, *consumption* everywhere takes the lead. In England, as above shown, more than 50,000 deaths occur from it annually. In New York, of 10,000 deaths, 6000 are from this disease; in Ohio and Maryland, each 2000.

Dr. E. Jarvis states that in Massachusetts, of every 1000 deaths

during more than twenty years, 314 were from diseases of the lungs, 137 of affections of the digestive organs, 78 of disorders of the brain, and but 54 of old age.

Philadelphia statistics give the following as the most usual order of causes of deaths*: 1. Consumption (phthisis). 2. Scarlet fever. 3. Pneumonia. 4. Convulsions. 5. Marasmus (a wasting disorder of children, involving the bowels mainly). 6. Typhoid fever. 7. Diarrhœa and dysentery. Other maladies follow in more variable proportion.

Mortality has been much reduced in many places by improving the local conditions of health. Illustrations of this may be found in different quarters of the world. Nowhere, however, have they been more exactly ascertained than in England.

Baldwin Latham ("Sanitary Engineering") gives this table of

RESULTS OF SANITARY IMPROVEMENTS.

Towns.	Population 1861.	Average Mortality in 1000 before Construction of Works.	Average Mortality in 1000 since Completion of Works.	Saving of Life.	Reduction of Typhoid Fever Rate.	Reduction in Rate of Phthisis.
				Per cent.	Per cent.	Per cent.
Banbury	10,238	23.4	20.5	12½	48	41
Cardiff	32,954	33.2	22.6	32	40	17
Croydon	30,229	23.7	18.6	22	63	17
Dover	23,108	22.6	20.9	7	36	20
Ely	7,847	23.9	20.5	14	56	47
Leicester	68,056	26.4	25.2	4½	48	32
Macclesfield	27,475	29.8	23.7	20	48	31
Merthur	52,778	33.2	26.2	18	60	11
Newport	24,756	31.8	21.6	32	36	32
Rugby	7,818	19.1	18.6	2½	10	43
Salisbury	9,030	27.5	21.9	20	75	49
Warwick	10,570	22.7	21.0	7½	52	19

A remarkable example of the good effect of "sanitary police" was afforded by the city of Philadelphia in 1866. Epidemic cholera, being in Western Europe, was expected here that summer. The Board of Health made uncommon exertions to cleanse the city throughout; and

* According to Board of Health reports, the order during the first six months of 1884, in Philadelphia, was as follows: Consumption of the lungs, 1445 deaths; pneumonia, 782; convulsions, 424; scarlet fever, 386; typhoid fever, 325; marasmus, 298; diarrhœa and dysentery, 74. The second half of the year, including the hot summer months, will yield a much larger mortality from diarrhœa and dysentery.

the citizens, in fear of cholera, promoted their labors. In consequence, although 908 deaths occurred during the year from *cholera*, the *total mortality* for the year was less than that of the previous year by 366! Here are the official figures:

Total number of deaths in 1865 . .	17,169
Total number of deaths in 1866 . .	16,803
Decrease	366

The New York *Nation*, in May, 1887, said:

"The last report of the Registrar-General in England furnishes fresh evidence of the steady progress which is making in the prolongation of human life, especially through the influence of the sanitary measures adopted during the last thirty years. The death-rate for 1886 was 19.3 per thousand of the population, which was lower than that recorded in any previous year since the registration system was started in 1837, with the two exceptions of 19 in 1885 and 18.9 in 1881. The mean annual death-rate for the six years since 1880 did not exceed 19.3, which was 2.1 below the mean rate between 1870 and 1880. This means that 339,000 persons in England and Wales were alive at the end of those six years who would have been dead if the rate of mortality which prevailed between 1870 and 1880 had been maintained. The reduction is largely accounted for by the falling-off in the deaths from the principal zymotic or 'filth diseases,' which have sunk from an annual rate of 4.15 per thousand between 1860 and 1870 to 3.40 between 1870 and 1880. The proportion of infant mortality has also been perceptibly diminished, falling from an average of 149 per 1000 births during the ten years preceding 1880 to 141 in the six years since then. The birth-rate itself last year was only 32.4, which is lower than in any previous year since 1848, and the natural increase of population by the excess of births over deaths accordingly shows a decline from 375,922 in 1884 and 371,520 in 1885 to 366,138 in 1886."

Health of American Cities.

According to a table of the mortality of twelve of the principal cities of the United States in 1890, the percentage of deaths to each thousand of residents is as follows:

New Orleans . .	29.90	Washington . .	24.08	Cincinnati . .	21.73
New York . .	26.49	Baltimore . .	23.48	Philadelphia .	20.79
Cleveland . . .	25.09	San Francisco .	23.08	Chicago . .	19.89
Brooklyn . . .	24.58	Boston . . .	22.70	St. Louis . .	15.26

UNHEALTHY EMPLOYMENTS.

Those which are especially apt to injure health and shorten life are these:

Working in **lead**, or with **lead paint.**

Coloring wall-paper, artificial flowers, etc., with **Paris green,** or other **arsenical** colors.

Making or working with **aniline** dyes.

"Silvering" mirrors with **mercury.**

Making and working in **brass** and brass-ware.

Making lucifer-matches containing **phosphorus.**

Needle-grinding and **fork-grinding.**

Cotton-spinning, and working in **feathers, wool, hair, bristles, flints,** or **coal. Fur-sewers** usually have short lives.

Vulcanizing India-rubber (with bisulphide of carbon).

Glass-blowing (interfering with natural breathing and circulation).

By *lead-poisoning,* either or both of two maladies may be caused: lead *colic* and lead *palsy.*

Arsenical poisoning sometimes occurs with those who live or sleep in rooms papered with wall-paper colored with arsenical green,* and with children playing with toys, baby-houses, etc., colored with the same. Other colored wall-papers, besides green, may contain arsenic. Its use in this way, when detected, ought to be punished with severe legal penalties. Slow poisoning under such causation may not always be recognized. The sufferer is apt to have inflamed eyes, headaches, bad sleep, and nervousness; even death is believed thus to have resulted in a few instances.

Aniline dyes often contain a portion of arsenic, making them poisonous; but even without this, they may irritate the skin considerably. Wearing stockings dyed with aniline red, with some people brings out painful eruptions upon the legs and feet.

Mercurial poisoning, from working with quicksilver, may be attended by very serious *palsy* of the limbs; and bad nervous symptoms have repeatedly attacked workers in *brass*—"brassfounder's ague."

Phosphorus, used in making matches, is absorbed into the mouth and nostrils from the air, and affects the *upper-jaw,* in some cases destroying the jaw-bone (*phosphor-necrosis*).

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* Such may be *tested,* thus: drop on a piece of the paper two or three drops of *water of ammonia* (spirit of hartshorn); this will make the green *blue.* Next, put on it a little powdered *lunar caustic* (nitrate of silver); it will then become *yellow.*

Needle- and *fork-grinding* are injurious because of the fine particles of stone (from the grindstone) and steel flying *in the air*, and getting into the breathing-tubes and lungs. Similar danger attends working with *cotton, feathers, wool, hair, bristles, flints,* and *coal.* Of all particles breathed, those of coal-dust probably do the least harm. But coal-heavers may have an immense quantity of black dust collected in their lungs. I remember one of them, a patient with a chronic cough, who had a black expectoration for several weeks after entering the hospital.

Vulcanizing India-rubber is injurious by reason of the use of the poisonous *bisulphide of carbon* in the process.

Glass-blowing induces, as any one may see in looking at the work, a great interruption of the ordinary regularity of breathing, and so of the *aeration* as well as circulation of the blood. This is made worse by the heat to which the blowers are exposed. Yet some become, by habit, wonderfully adapted to the work, and endure it for years.

Are not some means of *protection* to be had against the harm done in some of these occupations? Yes; but the ignorance and recklessness of many defeat efforts made to so protect them.

For *lead-workers,* always *washing the hands* carefully after work, and particularly before eating, is very important. When necessarily much exposed, drinking moderately of a weak *sulphuric acid lemonade* is said to be a preventive of lead-poisoning. (This must be very cautiously used, as sulphuric acid is itself a poison.) The same precaution about *washing the hands* thoroughly and often will apply to working in *aniline* dyes, or in *arsenic, copper,* or *brass,* etc.

Where fine *particles* are flying into the air, one arrangement is to place a *glass screen* before the operative, with holes for his arms to pass through. Another plan is to have a *fan* to draw the particles constantly *downwards,* away from the face, and through gratings in the floor.

Against *phosphorus*-poisoning in making lucifer matches, a valuable preventive is said to be, hanging from the neck an open vial of *spirit of turpentine;* which antagonizes the influence of the phosphorus.

Photographers are, unless they are careful, exposed to danger from the use in their work of the deadly poison, *cyanide of potassium. Sewing-women* are said to have sometimes been affected with lead-poisoning from putting frequently in their mouths (to thread their needles) threads made glossy with sugar (acetate) of lead. Poisoning from passing soft drinking water through lead pipes, or storing it in leaden cisterns, etc., has been treated of (under **Our Homes**) in another part of this book.

Sewer-cleansing cannot be a wholesome employment. But it is remarkable how some men, at least, can get well used to it. A very

hearty-looking contractor for cleaning wells, etc., told me lately that he had been in that business for thirty-four years.

All *sedentary* employments, as those of bookkeepers, other clerks, seamstresses, etc., must be less favorable to health than such as take people actively out of doors. Those predisposed to *consumption of the lungs* ought especially, from childhood up, to prefer *active* out-of-door living. *Miners* are apt to be short-lived; and most of all those who (as in some mines in Europe) never or seldom come above ground; spending their lives in the dampness and half-night of their vast artificial caverns.

Accidental deaths do not come within our present scope; or else we would have to refer to *railway brakesmen* as the shortest lived of all!

Factory operatives, of both sexes and all ages, have long been in many countries sufferers from ill-health and short-lived. Some years since, the average age at death of the weavers of Leicester, England, was eighteen years. Of 1078 children working in English spinneries, only 22 reached the fortieth year, and only 9 the fiftieth year. The average age of factory people in the cities of France is nineteen years; while elsewhere in that country it is forty-three years.

From the beginning of this century benevolent persons have been trying to better the condition of the *children* of factory populations, especially in England. Government commissions were appointed on the subject in 1840 and 1861. Elizabeth Barrett Browning's piece, the "Cry of the Children," has touched many hearts:

> "All day we drive the wheels of iron
>   In the factories, round and round;
> For all day the wheels are droning, turning—
>   Their wind comes in our faces—
> Till our hearts turn, our heads with pulses burning,
>   And the walls turn in their places—
> Turns the sky in the high window blank and reeling,
>   Turns the long light that drops adown the wall,
> Turn the black flies that crawl along the ceiling;
>   All are turning all the day, and we with all!
>
> * * * * * *
>
> Our blood splashes upward, O gold heaper,
>   And your purple shows your path;
> But the child's sob in the silence curses deeper
>   Than the strong man in his wrath!"

At lace-making in Nottingham, formerly children not more than two or three years old were constantly employed; at earthenware manufacture, in the Staffordshire potteries, some under five years of age; and

many children also in straw-plait manufacture, lucifer match-making, fork-grinding, etc.

Probably no worse oppression has ever existed than that of the "gang system" of farm labor in parts of England. It was thus described some years ago:

"The gang system, as recently exhibited in Parliament, in brief is this: In the Fen districts, covering nearly a million of acres of the richest land in England—Huntingdonshire, Cambridgeshire, Nottinghamshire, Norfolk, Suffolk, and in parts of the counties of Northampton, Bedford, and Rutland—about 7000 children, from five years of age and upwards, besides persons of both sexes of from fifteen to eighteen years of age, are employed in gangs numbering from fifteen to twenty laborers in each gang, under a master, and in a condition differing from slavery only because it is infinitely worse.

"The gang-master is almost invariably a dissolute man, who cannot get steady employment as a laborer with any decent farmer. In most instances he actually purchases the labor of the children from poor parents; he sells this labor to farmers, pays the gang what he pleases, and puts the profit in his pocket. For seven or eight months in the year these gangs are driven, often seven or eight miles a day, to farms where they work at planting, weeding, picking, stone gathering, and like labor, from half-past five in the morning to seven or eight o'clock in the evening. The gang-master is paid by the day or by the acre; and he pays the little children from fourpence to sixpence per day, while the older lads and girls receive from nine to fifteen pence. The master, for driving his hands to the field and for keeping them up to their work, which he does with a stick, makes an estimated profit of a pound sterling, or thereabouts, a week."

The French law of 1841 limited the age after which children might be put at work in factories at eight years. More recently, it has been made ten years; boys under thirteen, and girls under fourteen, being allowed only half-time; and night-work being forbidden for boys under sixteen and girls under twenty-one years. In Germany, the limit of age has long been twelve; and each day ten hours only are allowed for those under sixteen years.

Machinery has rendered it possible to make more use than formerly of young laborers in factories. In the United States, in 1870, 739,174 children between ten and fifteen years of age were employed in various ways; in 1880, 1,118,356. This increase occurred chiefly in the manufacturing districts of the country.

Pennsylvania laws now require ten hours to be the limit of daily labor in all cotton, woollen, silk, paper, bagging, and flax factories;

and forbid any minor being employed in any such establishments under thirteen years of age. Those between thirteen and sixteen must be so engaged not more than nine months in the year, and then only when three months of the same year are spent in attending school. Also, no operative under twenty-one years of age shall be employed in cotton, woollen, silk, flax, or paper factories for more than sixty hours during one week. These laws are by no means always strictly conformed to; but public attention has lately been renewedly called to the matter by the "Society to Protect Children from Cruelty," with good and hopeful effect.

Much depends in factory life upon the *air* supplied for operatives to breathe; as well as upon the conditions of their *dwellings*. In Philadelphia, and in the great manufacturing towns of New England, it is not probable that the lives of the factory men and women are much shorter than those of other working people in the same localities.

LIFE ASSURANCE.

Whoever has anything to lay by from year to year, and has a wife, children, or others dependent upon his resources for their living, will do well to invest a part of his surplus in a life-insurance policy. A *safe company* must be chosen; and then an *early* investment in this way has the advantage of *lower rates*, as these are adjusted according to age, in view of the estimated *probability of life*. Healthy people naturally expect to live long, and so incline to put off insuring their lives; but, *if their health fails*, no company will insure them; and if they wait till they are old, it may cost too much at the advanced rates.

Here are two tables of Expectation of Life: the first foreign; the second American:

Age.	Expectation.	Age.	Expectation.	Age.	Expectation.	Age.	Expectation.
10	47.5 years.	33	31. years.	56	16. years.	79	5. years.
11	46.7 "	34	30.3 "	57	15.4 "	80	4.7 "
12	46. "	35	29.7 "	58	14.8 "	81	4.4 "
13	45.2 "	36	29. "	59	14.2 "	82	4.1 "
14	44.5 "	37	28.3 "	60	13.6 "	83	3.9 "
15	43.7 "	38	27.6 "	61	13. "	84	3.6 "
16	43. "	39	27. "	62	12.5 "	85	3.3 "
17	42.33 "	40	26.3 "	63	12. "	86	3.1 "
18	41.6 "	41	25.6 "	64	11.4 "	87	2.8 "
19	40.8 "	42	24.9 "	65	10.9 "	88	2.5 "
20	40.1 "	43	24.3 "	66	10.4 "	89	2.3 "
21	39.4 "	44	23.6 "	67	9.9 "	90	2.1 "
22	38.7 "	45	23. "	68	9.4 "	91	1.8 "
23	38. "	46	22.3 "	69	9. "	92	1.6 "
24	37.3 "	47	21.6 "	70	8.5 "	93	1.4 "
25	36.6 "	48	21. "	71	8.1 "	94	1.2 "
26	35.9 "	4[illegible]	20.3 "	72	7.6 "	95	1.1 "
27	35.[illegible] "	5[illegible]	19.7 "	73	7.2 "	96	1. "
28	34.[illegible] "	5[illegible]	19.[illegible] "	74	6.8 "	97	.92 "
29	33.8 "	52	18.4 "	75	6.4 "	98	.75 "
30	33.1 "	53	17.8 "	76	6.1 "	99	.50 "
31	32.4 "	54	17.2 "	77	5.7 "		
32	31.7 "	55	16.6 "	78	5.4 "		

AMERICAN EXPERIENCE TABLE.

Age Nearest Birthday.	Expectation of Life.	Age Nearest Birthday.	Expectation of Life.	Age Nearest Birthday.	Expectation of Life.
25	38.8	37	30.4	49	21.6
26	38.1	38	29.6	50	20.9
27	37.4	39	28.9	51	20.2
28	36.7	40	28.2	52	19.5
29	36.0	41	27.5	53	18.8
30	35.3	42	26.7	54	18.1
31	34.6	43	26.0	55	17.4
32	33.2	44	25.3	56	16.7
33	33.9	45	24.5	57	16.1
34	32.5	46	23.8	58	15.4
35	31.8	47	23.1	59	14.7
36	31.1	48	22.4	60	14.1

The following is a carefully prepared table for the city of Philadelphia:*

PHILADELPHIA.

Age.	Living.	Dying.	Proportionate Mortality, per 1000.	Expectation, Number of years.
	No.	No.		
0	100,000	18,038	180.38	35.09
1	81,962	7,540	92.00	41.71
2	71,422	4,427	59.48	44.88
3	69,995	2,982	42.60	46.59
4	67,013	2,039	30.43	47.74
5	64,974	1,387	21.35	48.23
6	63,587	943	14.83	48.27
7	62,644	651	10.40	47.99
8	61,993	470	7.58	47.49
9	61,523	362	5.88	46.84
10	61,161	297	4.88	46.12
11	60,864	251	4.14	45.34
12	60,613	236	3.88	44.53
13	60,377	238	3.95	43.70
14	60,139	255	4.24	42.87
15	59,884	278	4.64	42.05
16	59,606	307	5.18	41.24
17	59,299	343	5.76	40.45
18	58,956	378	6.40	39.69
19	58,578	414	7.10	38.94
20	58,164	456	7.83	38.21
21	57,708	493	8.55	37.51
22	57,215	529	9.24	36.83
23	56,686	560	9.88	36.17
24	56,126	587	10.48	35.52
25	55,539	610	11.00	34.89
26	54,929	629	11.45	34.28
27	54,300	643	11.83	33.67
28	53.657	653	12.18	33.07
29	53,004	662	12.50	32.47
30	52,342	672	12.84	31.87
31	51,670	681	13.18	31.28
32	50,989	689	13.52	30.69
33	50,300	698	13.88	30.10
34	49,602	706	14.24	29 52
35	48,896	716	14.63	28.94
36	48,180	722	15.00	28.36
37	47,458	730	15.38	27.79
38	46,728	736	15.76	27.22
39	45,992	743	16.15	26.64
40	45,249	748	16.53	26.07
41	44,501	754	16.94	25.50
42	43,747	760	17.38	24.93
43	42,987	766	17.83	24.36
44	42,221	772	18.30	23.79
45	41,449	778	18.78	23.23
46	40,671	784	19.28	22.66
47	39,887	789	19.78	22.10
48	39,098	795	20.33	21.54
49	38,303	800	20.90	20.97
50	37,503	807	21.50	20.41
51	36,696	813	22.15	19.85
52	35,883	821	22.88	19.28
53	35.062	830	23.66	18.72
54	34,232	840	24.54	18.17
55	33,392	851	25.50	17.61
56	32,541	865	26.56	17.06

Age.	Living.	Dying.	Proportionate Mortality, per 1000.	Expectation, Number of years.
	No.	No.		
57	31,676	877	27.70	16.51
58	30,799	891	28.93	15.97
59	29,908	905	30.25	15.43
60	29,003	918	31.65	14.89
61	28,085	931	33.18	14.36
62	27,154	946	34.84	13.84
63	26,208	961	36.66	13.32
64	25,247	978	38.72	12.81
65	24,269	996	41.04	12.30
66	23,273	1,016	43.64	11.81
67	22,257	1,036	46.55	11.32
68	21,221	1,055	49.75	10.85
69	20,166	1,073	53.22	10.39
70	19,093	1,087	56.94	9.95
71	18,006	1,096	60.88	9.52
72	16,910	1,101	65.08	9.11
73	15,809	1,098	69.48	8.71
74	14,711	1,090	74.10	8.32
75	13,621	1,076	78.96	7.94
76	12,545	1,054	84.06	7.58
77	11,491	1,028	89.44	7.23
78	10,463	995	95.14	6.89
79	9,468	959	101.20	6.57
80	8,509	916	107.66	6.25
81	7,593	870	114.56	5.94
82	6,723	819	121.92	5.65
83	5,904	767	129.80	5.36
84	5,137	710	138.18	5.09
85	4,427	651	147.08	4.82
86	3,776	591	156.57	4.57
87	3,185	539	169.20	4.32
88	2,646	484	183.42	4.10
89	2,162	439	203.10	3.91
90	1,723	389	225.54	3.78
91	1,334	319	239.32	3.63
92	1,015	247	243.00	3.75
93	768	187	243.49	3.79
94	581	142	244.40	3.85
95	439	107	243.36	3.94
96	332	80	239.67	4.04
97	252	59	234.40	4.16
98	193	43	225.54	4.28
99	150	31	205.67	4.38
100	119	23	192.76	4.39
101	96	18	186.42	4.31
102	78	14	182.86	4.19
103	64	12	180.78	4.01
104	52	9	179.65	3.79
105	43	8	178.90	3.51
106	35	6	178.60	3.16
107	29	5	181.54	2.75
108	24	6	189.04	2.25
109	18	6	205.12	1.74
110	12	5	....	1.37
111	7	4	....	1.05
112	3	2	....	.80
113	1	1	....	.50
114	...	...	....	...

* Calculated by Prof. Pliny E. Chase, LL.D., for the Provident Life and Trust Company, of Philadelphia, in 1869.

Prof. Chase calculated also a similar table from the records of mortality amongst members of the "Society of Friends."

Deductions from the Foregoing Tables.*

	Friends. Per 1000.	Philadelphia. Per 1000.	Advantage of Friends.
Proportionate Mortality (in first year) . .	124.66	180.38	44.70 per cent
Average Proportionate Mortality, from twenty to sixty inclusive (the term during which insurances are most frequently effected) .	14.25	17.58	23.37 "
	Years.	Years.	
Probability of Life † ("vie probable") . .	48.08	33.44	43.78 "
General Expectation ‡ (at birth) . . .	43.73	35.09	24.62 "
Greatest Vitality. Age 12	310.56	257.74	20.49 "
If no diminution of vitality occurred in those existing at that age, the above is the term of life that would be reached by some one of those living.			

According to the records of the Society of Friends in England, the average age of its members at death, between 1860 and 1870, was between fifty and fifty-five years. Next to them in special longevity come the Jews.

The experience of life insurance companies in this country has demonstrated the fact that, both at the younger and older periods of life, the results of mortality experience have been less favorable, while that of middle life has been more favorable, than that experienced abroad.

The classification of lives adopted by different insurance companies is much the same for all. The following may be considered an example. It is that adopted by the English and Scottish Law Life Assurance Association:

Classification of Lives.

Class I. Superior lives: having the prospect of more than average duration.

Class II. Average lives: involving no peculiar hazard, or presenting

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* The Philadelphia table is based upon records of 425,502 interments, 265,590 births, and seven successive decennial census enumerations; the Friends' table upon records of 14,666 interments, 4264 births, and eight enumerations.

† Out of 10,000 born in the Society of Friends, nearly 5000 die before reaching the age of forty-eight; that age is therefore the probability of life; the probability of any one dying before reaching that age being as great as of surviving it.

‡ Out of 10,000 born under same conditions as above, the 5000 dying under forty-eight will attain an average of about seventeen years. The 5000 dying over forty-eight will attain an average of about seventy-one years. The mean between these two, to wit, forty-four years, is therefore the *general expectation*.

only unfavorable features of so slight a nature as to form no objection to assurance at the ordinary rate of premium.

Class III. Inferior lives: involving increased risk on account either of family history or personal condition, and therefore requiring an equivalent addition to the ordinary rate of premium.

The information to be acquired by the medical examiner may be classed under three heads:

1st. Present state of health of applicant.

2d. His past history.

3d. The peculiarities of the family.

It is usually required of any one applying to have his life insured, to obtain a certificate from his family physician, or some other practitioner well acquainted with him, giving answers to certain stated questions in regard to his health. Besides this, the life assurance companies have their own medical examiners, who make a careful inquiry into every applicant's "probability of life."

Causes of Rejection.

First. Where both parents have died of phthisis (consumption).

Second. Where one parent has died of this disease, and it has appeared in the offspring, unless the applicant possess a healthy conformation, and has reached at least the age of thirty-five years.

Third. Where the party has been affected with paralysis, apoplexy, epilepsy, hereditary insanity, loss of sense and voluntary motion, or symptoms denoting softening of the brain.

Fourth. Intermittence and irregularity of the pulse or heart's action, abnormal sounds in this organ, symptoms indicating hypertrophy of the heart, aneurism and ossification of the blood-vessels, habitual cough, difficulty of breathing, and asthma.

Fifth. If the pulse be persistently over ninety, after repeated trials.

Sixth. Diseases of the digestive organs, materially affecting the health of the applicant, psoas or lumbar abscess, coxalgia (hip disease), unless a long period of cure has elapsed. The existence of an open ulcer, scrofula, frequent attacks of erysipelas, and colic.

Seventh. Gout, fistula, irreducible hernia (rupture), disease of the spine, and important tumors, etc.

Eighth. Disease of the kidneys, bladder, calculus (stone), gravel, secondary syphilis, blindness, permanent stricture, and amputation at the shoulder-joint or above the knee.

Ninth. Cancer or other malignant disease; and where, after any illness, its effect is perceptible in loss of vigor in the constitution, thereby predisposing to renewed attacks of the malady.

Tenth. When from any cause the company has a well-founded doubt whether the applicant will reach his expectation of life the risk is declined.

Habitual intemperance is always a cause of rejection, when it is *known*. Its omission from the above list is due merely to the difficulty examiners often have, with applicants who are strangers to them, in making it certain. It is included, however, under the expression, "any cause of well-founded doubt" as to the safety of a life.

While the rates charged for life assurance, based upon estimates of the general expectation of life, are large enough to bring good profits to successful companies, yet experience shows that, with those whose *earnings* are the sole or chief dependence of themselves and their families, and who earn yearly more than they need to spend, no other investment of this surplus is likely to be better in the end than one which provides that, when those earnings cease, an accumulated principal shall take their place, in the form of life insurance.

GREAT LONGEVITY.

Learned Biblical scholars are not agreed as to the true rendering of the account of the ages of the Patriarchs mentioned in the Book of Genesis. Some of them hold that by the term commonly translated "years" are meant periods each of not more than three months. It is, however, altogether conceivable that during the fresh vigor of the youth of the human race life was much longer than now. "Threescore years and ten" are mentioned in the Scriptures as, in Solomon's time, what would be called the "expectation" of human life. Yet, apart from the commonly understood centuries of Methuselah and others, good reason exists for believing that, at its early best, the longevity of man ought to have been at least two hundred years; and that *now* it ought to be, under the most favorable conditions and circumstances, *a hundred years.*

Actually, nowadays, not more than about one in 3000 or 4000 people born is a centenarian; while, of every 1000 born, from 150 to 200 die in their first year, and from 250 to 400 under five years of age; the average duration of human life being under, or perhaps now about, forty years.

Dr. Farr, a noted English authority, says that if one could watch the march of 1,000,000 people through life, the following result would be observable: Nearly 150,000 will die the first year, 53,000 the second year, 28,000 in the third year, and less than 4000 in the thirteenth year. At the end of forty-five years 500,000 will have died. At the end of sixty years 370,000 will be still living; at the end of eighty years, 97,000; at eighty-five years, 31,000, and at ninety-five years, 2100. At the end of one hundred years there will be 223, and at the end of one hundred and eight years there will be but one survivor.

Tradition, beginning in the obscurity of antiquity, gives a considerable list of men and women said to have exceeded a century of longevity. Among these were Hippocrates, "father of medicine," 100 years; Saint Anthony, 105; James the Hermit, 104; Saint Jerome, 100; Simeon Stylites, 109; Cardinal de Sales, 110; De Belloy, Archbishop of Paris, 100; Kentigern (St. Mongah), 185! Ephraim Pratt, of Shutesbury, England, 117; his son, Michael Pratt, 103; Henry Francisco, in this country, 140. One record published in England names the following also: Robert Pooles, of Tyross in Ireland, 116 (died in 1742); Mary Power, aunt of R. Lalor Sheil, 116; David Kerrison, a soldier of our Revolution (died 1852), 117; Ursal Chicken (!), of Holderness, England, 120 (died 1722); Charles Cottrell, of Philadelphia, dying (1761) 120 years old, left a wife 115, they having lived

together 98 years; a Duchess of Buccleugh, 20 years a maiden, 50 years a wife, 50 years a widow, died (1728) 120 years old; William Beatty, who fought at the battle of the Boyne (died 1774), 130 years; Mrs. Keith, of Newnham, 133; John McDonach, of Ennis, Ireland, 138; Countess of Desmond, who went to market on foot almost to the day of her death, 140! A slab on the floor of a church building in Herefordshire is inscribed with the name of Elizabeth Lewis, dying in 1715, aged 141 years. One Eckelson, in Ireland, was reputed to be at his death in 1696, 148 years of age. A tombstone in Conway churchyard records that Lowry Owens Vaughan (a woman) died in 1766, aged 192!

In Scotland (says another account), James Lawrence reached the end of his 140th year; the Countess Electon, at death, counted 143; Thomas Winslow, 146; Elsphet Watson, 115 (only 33 inches in height); in England, John Effingham, 144; Francis Consist, 150; in Norway, Jonas Surrington, 159; in France, Jean Claude Jacob, a member of the Academy, 121; Fontenelle, Secretary of the Academy, 100; in Spain, Dr. Verdugo, oldest physician of his time (1868), 105; at Rome, Madeline Onofri, 121; Venice, Marquis Cornaro, 100; in the United States, Joseph Crele, of Detroit, 141.

Very famous were the two English patriarchs, Thomas Parr, dying in London in 1635, aged 152 years by the records, and Henry Jenkins of Yorkshire, dying in 1670, aged 169. Parr's death was, after all, premature. His renown took him to London, as a sort of lion in society; they feasted him so bountifully that the unaccustomed dissipation shortened his days.

Other instances, less noted, have been those of Keziah Smith, of Virginia (dying in 1868 or 9) 125 years; a Pole deceased about the same time, 139; Rachel Byer, said to be living in Iowa, in 1866, 114; a Canadian hunter and guide in Kansas, 134; Baron de Waldeck, a great traveller, dying in 1875, 109; George Labar, of Monroe County, Penna., who died in 1874, 111; Mary Loquaire, native of San Domingo, dying in Philadelphia in 1872, 107; Augustus Picard, of Quebec, 107; Kate Shepp, of Harrisonburg, Va., 120; Nancy Roberts, of Philadelphia, burned to death in 1871, 110 to 120 years.

Mrs. Helen Hunt Jackson described in the *Christian Union* in 1883, a woman named Eumesia, whom she visited in the far West in 1882; who was shown on good evidence to have been born in 1760.

W. J. Thoms, F. S. A., of London, published in 1873 an essay on Longevity; in which he asserted that he had found reason to discredit the great ages ascribed by common report to Henry Jenkins, Thomas Parr, and the Countess of Desmond, above mentioned. He admits, however, at least five centenarians: Jane Chassereau Williams, of Lon-

don, 1739–1841; William Plank, of England, 1767–1867; Jacob W. Luning, of Hanover, 1767–1870; Catharine Eden, of England, and David Rennie, of Scotland. His reviewer in the New York *Nation*, mentions also seven authenticated instances: Four Harvard graduates, Dr. E. A. Holyoke, Timothy Farrar, Sampson Salter Blowers, and Dr. Ezra Green, Daniel Waldo, Mehitable Barker Piper, and Anna Simpson Dix. Sir Moses Montefiore, the wealthy and benevolent English Israelite, is now living (1885) in his hundredth year; and Chevreul, the great French chemist and professor still delivers lectures, although certainly more than ninety-four years old, according to one account nearly ninety-nine. Shall we wish longer life to them? *

Very great age is scarcely to be wished for, so many are its privations and infirmities. Yet, with all the appliances of our modern civilization, it may now be made more tolerable than ever before.

HOW TO LIVE LONG.

No one of the venerable company of those who have survived a hundred years has left behind any special secret of long life.† All that we

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* The following is from a Philadelphia daily paper of 1883:

A Lively Centenarian.—Miss Sabra Gibbs, whose residence at Norwood, R. I., goes beyond the memory of the oldest inhabitant, has, according to the record, finished her one hundredth year. She lives alone, does all her own housework, saws wood for her own fire, and brings it on her back from the woods. She is a constant reader of the Bible and religious books, reads without glasses, and is always ready to expatiate upon any passage of Scripture, which she often does to those gathered around her. She is the last of her generation. She has buried two sisters, Esther dying at the age of one hundred years, and Hannah at nearly the same age.

As remarkable, at a somewhat earlier age, was the statement made in the summer of 1884, that Captain John W. Andrews, of Sumter, South Carolina, the ninety-three year old pedestrian, who started to walk to Boston, arrived in that city from Hartford by rail. On reaching Hartford, where he gave up walking, he had made 700 miles on foot, at an average rate of 22 miles per day.

† Horace Binney, of Philadelphia, who lived more than ninety years, said in answer to a question on the subject, "I have never taken any *long steps.*" He meant, probably, that he was never in a hurry, and undertook nothing beyond his strength. William Cullen Bryant, the poet, who died in consequence of an accident in his eighty-fourth year, wrote thus of his habits when about seventy-six: "I rise early, at this time of year (March) about half-past five; in summer, half an hour or even an hour earlier. I begin immediately, with little incumbrance of clothing, a series of exercises designed to expand the chest, etc. These are performed with dumb-bells, with a pole, a horizontal bar, and a light chair swung around my head. After a full hour passed in this manner, I bathe from head to foot . . . . My breakfast is a simple one—hominy and milk, or, in place of hominy, brown bread or oatmeal, and, in the season, baked sweet

can do, therefore, towards promoting such an end, is to **observe the great laws of health,** which we have been endeavoring to set forth at length in these pages. If, then, we fail, it must be from some uncontrollable cause, under Divine providence; and, without fatalism, we may say, like the devout Mussulman, "It is better so; God is good."

As a brief summary statement of the *most essential conditions* of health and longevity, we may conclude our study of Hygiene with the following precepts.

1. Never breathe three breaths of foul air when you can get out from it into that which is fresh, or can get fresh air into the place where you are.

2. Eat when you are hungry, and only wholesome food. Eat slowly, and stop as soon as hunger is satisfied.

3. Drink pure water when you are thirsty; take milk as a part of your daily food; a cup of tea, not too strong, if you like it, or cocoa; but coffee only when you are very tired; and alcoholic beverages, while in good health and strength, never. Also, make no use of tobacco.

4. Dress always with a view to comfort and convenience; not compressing the chest, nor impeding the movement of any of the limbs.

5. Be careful to maintain a regular habit of daily motion of the bowels.

6. Rest, if you can, when tired, and sleep when sleepy (unless in a place of worship). Take eight hours of sleep every night; more, if you feel the need of it, and can get it.

7. Work regularly at something every day, and do the best you can throughout; but avoid over-work. The sign of it is, that you wake up tired, not refreshed, in the morning.

8. Never do any regular week-day labor (simple unavoidable small chores excepted) on the first day of the week. Make it a day of repose and renovation for mind and body.

9. However rich you may be, do not make pleasure the aim and object of life; it will wear you out faster than work, or even worry.

Lastly, let every day be cheered by sunshine from above, and brightened by the hope of a better life to come.

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apples. . . . . Tea and coffee I never touch. Sometimes I take a cup of chocolate. . . . After breakfast I occupy myself awhile with my studies, and then, when in town, I walk down to the office of the *Evening Post*, nearly three miles distant, and, after about three hours, return, always walking, whatever the state of the weather or the streets. . . . . My drink is water, yet I sometimes, though rarely, take a glass of wine. I never meddle with tobacco, except to quarrel with its use."

DOMESTIC MEDICINE.

CAUSES, NATURE, AND SIGNS OF DISEASE.

REMEDIES.

NURSING.

SPECIAL DISEASES.

ACCIDENTS AND INJURIES.

POISONING.

OLD AGE AND DEATH.

ORGANS OF THE CHEST AND ABDOMEN.

1. Aorta.
2. Pulmonary Artery.
3. Innominate Artery.
4. Left Carotid Artery.
5. Left Subclavian Artery.
6. Vena Cava.
7. Left Vena Innominata
8. Right Vena Innominata

H. Heart.
l. Larynx.
L. Liver
g. Gall Bladder.

C.C.C. Colon.
S. Stomach
SI.SI. Small Intestines.

PART I.

CAUSES, NATURE, AND SIGNS OF DISEASE.

WHAT IS DISEASE?

IT was a rather strange idea of a recent distinguished writer upon Hygiene, that perhaps, if we understood perfectly all the laws of health, and obeyed them all, life might be indefinitely prolonged. Nature around us pronounces otherwise. Every tree, though it live a thousand years, withers, root and branch, at last. All the animals, from the long-lived elephant and tortoise down to the *ephemeral* insect floating on the breeze, have set terms of life. On this globe of ours, whatever organism is born, dies. *Man's body* furnishes no exception; his spirit, only, is immortal.

With Cornaro, La Fontaine, and Montefiore, we might, possibly, many of us, live to our hundredth year, were we perfectly wise and well-conducted all through; if, also, we inherited entirely *good constitutions* from the start. More than that ought not to be expected of anybody. But, why is it that scarcely one in some thousands lives so long? Babies, even, die often in their first or second year; some are dead-born; many thousands end their brief existence in childhood, youth, or early middle life. Should we wonder at this?

No. The marvel rather is, that so delicate a mechanism as the human body can survive for a single year, amongst the various perils that surround it. Think of it. A needle's point passing into the heart might stop its motion at once. A tiny knife-blade severing a small tube in the side of the neck will let life out in a few moments or minutes. Only a few drops of prussic acid, or woorara poison, on the tongue, or street electric-light wire just touching the hand or foot, will kill *instanter*. We are almost the frailest of creatures on the earth.

Yet we live on, some of us, accidents apart, for a good while. Most persons fail to reach advanced age, because of **disease**. What is disease?

It is *something either being or acting wrong in the body*. There may be as many kinds of disorder, or disease, at least, as there are organs of the body. *More* than that there really are, however; because *complica-*

tions of diseases occur, and each organ, or the general system, may be out of sorts in a large number of different ways.

First, it will be well for us to consider *what makes* the body, or parts of it, get out of order; in other words, let us give some brief attention to what medical writers call **Etiology.**

CAUSES OF DISEASE.

These may be stated together, thus: as causes which are—

Hereditary; examples (though *not always* inherited), consumption, gout, epilepsy, cancer.

Functional: that is, depending upon the action, either too great or too little, of one or more of the organs, or of the body generally. Examples: over-exertion, over-excitement, loss of sleep; or, on the other hand, want of exercise.

Mechanical: as wounds or injuries of various kinds, tight-lacing, etc.

Conditional: as extremes of heat or cold, sudden changes of temperature, dampness of dwellings.

Digestive: as poisoning, unwholesome food, intemperance, abuse of medicine; and, on the other hand, starvation.

Obstructive: as neglect of the bowels, uncleanliness of the skin, ill ventilation.

Contagious: as small-pox, itch, hydrophobia.

Atmospheric: as autumnal fevers, yellow fever, cholera.*

Hereditary Disease.

We often see consumption affecting several members of the same family through several generations. The same is true of insanity. Gout is many times transmitted from father to son, but seldom to a third generation. Epilepsy, also, does not often extend to grandchildren, nor does cancer. Each of these diseases may come *without* inheritance. Then, we can sometimes, though not always, find at least a partial explanation of their origin otherwise.

Not all (if there be several) children in a family are likely to have the inheritable disease. Perhaps all may escape it; now and then it comes again in *their* children, having skipped a whole generation.

Children are not *born* with transmitted diseases; except syphilis,

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* Critical readers will observe that this inclusion differs from present popular opinion; but the difference is the result of deliberate conviction, after much study of the subject.

among those of real constitutional inheritance, and a few of the *contagious* affections. They are commonly affected with them about the time of life when their parents were so. Thus *scrofulous* disorders of the eyes, ears, skin, glands, and bones, are apt to show themselves in childhood; *consumption* of the *lungs*, in youth or early maturity; *gout*, near middle age; *apoplexy*, and *disease of the heart*, from fifty to seventy years; early *deafness*, or *blindness*, at various periods in different families.

Sometimes the inherited taint is *modified* in transmission. Thus the children of a gouty person may have, not regular gout, but neuralgia; and the offspring of one who is insane may have inflammation of the brain, or convulsions, etc. Children of *intemperate* parents are very likely to have some impairment of their nervous systems, and often die in infancy.

Besides these special transmissions of tendencies to disease, there is a gradually degenerating influence in families, and even whole populations, from *unhealthy living:* most observed in large cities, where it may be called "the **great town** system." Poverty, intemperance, and other vices, with crowded and uncleanly dwellings and surroundings, make up this; nowhere worse, perhaps, than in the tenement-houses of New York; which have, in past years, made up more than half the mortality of that city. Latterly, by the efforts of wise citizens, they have begun to be considerably improved.

Functional Causation.

Our examples of this, above given, need little further remark. Over-exertion may produce exhaustion, which, in a person before feeble, may end in death. Or, short of this, there may be brought on a state of weakness slow to be recovered from. In such a state, moreover, the body is less capable of resisting all causes of disease than when in full vigor.

Excessive efforts may, at the time, strain muscles, or even burst the heart, or the great main artery, the aorta. This is a *real* "broken heart." What is commonly so called is rather the effect of a great affliction upon the *whole system*, depressing all the functions, so as, in a few instances, to cause death.

Over-excitement of the brain is, in many cases, when it lasts but for a short time, followed simply by exhaustion and gradual return, through repose, to ordinary health. But long-continued excessive mental excitement may produce either *inflammation of the brain*, *insanity*, or prolonged *brain-exhaustion*. Loss of sleep, however induced, endangers such effects. Hardly any one can survive deprivation of sleep for so long as two weeks at a time; a single week would finish most people's lives.

Mechanical Injuries.

We will consider these after awhile; broken limbs, displaced joints, wounds, etc. Under **Hygiene**, we have seen how tight-lacing is a mechanical cause of interruption to the right action of the lungs and heart, crowding these and other organs into too small a space. *Position* of the body acts mechanically, sometimes, in promoting certain maladies. Whoever is predisposed to apoplexy, is especially liable to have an attack while stooping, or lying with the head low.

Conditional Causes.

By these we mean high heat, great cold, dampness, sudden changes and partial exposures of the body to either extreme, and electrical influences; these last being very little understood.

Sunstroke is a familiar accident in warm climates. *Cold-stroke* is less common, but I have known it to be almost as sudden as the opposite. *Continued heat* predisposes to disorders of the *liver*, *stomach*, and *bowels*. *Cold*, with *dampness*, promotes affections of the *lungs* and other organs within the *chest*.

Catching cold: what is it? For example; one comes in warm from exercise on a spring or autumn day, takes off his coat, and sits down near a window to "cool off." His skin is relaxed and moist with perspiration, whose evaporation, under the window-breeze, goes on rapidly. Suppose the breeze to blow on his back, between his shoulders. *That* part is cooled more than the rest of his body. *Its* blood-vessels and skin-pores contract under the cooling process, detaining the perspiration and driving the blood *inward* from the surface. Some of the waste matter which the skin would have thrown off by sweating, but for this chilling, is now kept in the blood. If there be, then, a weak or susceptible part within the chest (bronchial tubes, lungs, pleura, or heart) *it* suffers from overloading with blood and waste material; and we have a *bronchitis*, a *pneumonia*, a *pleurisy*, or an *inflammation of the heart*. Among these, the first is the most frequent, and the last the least so; but even it does sometimes happen, especially in a *rheumatic* person.

Digestive Morbid Causes.

Ingestive would be the more exact term; as some things taken into the stomach (*i. e.*, ingested), as poisons, for example, are not digested. Food, however, may have to do with producing sickness, in several ways.

Excess of food may cause indigestion at the time; or, if often repeated, *habitual* indigestion — called *dyspepsia*. A less amount of excess or superfluity may bring on an overfulness of rich blood in the system—*plethora*.

Deficiency of food weakens, and so promotes attacks of many disorders; varying according to constitution and exposure. *Absolute* privation of food, starvation, will kill most people within ten days. A few will survive for even three or more weeks, when kept *warm* and nearly at rest. Shipwrecked people starve sooner, because they are *cold* also, and altogether miserable.

Indigestible articles may produce common *indigestion*, with windy pain in the stomach, nausea, etc.; or *cholera morbus*, which is much more severe; occasionally dangerous. As was said under **Hygiene**, particular persons may be made ill by things which others can digest without difficulty.

Of the disorders produced by *intemperance*, we may, in this place, simply name *gout* (chiefly from excess of wine or malt liquors); *mania-a-potu* or *delirium tremens; gin-liver, kidney disease*, and other *degenerative* organic troubles. Intemperance becomes at last itself a disease; the habit of drinking alcoholic liquors to excess overpowering the will, so that its subject cannot break it off. This is sometimes called *methomania.*

Obstructive Causes.

Everything that interferes with the clearing out from the body of all waste and dead material, by the *excretions*, tends to injure health. Under **Hygiene**, it has been shown how ill ventilation, that is, breathing foul air, makes the blood impure. Not only will this kill at once if carried to a certain extreme, but, short of that, it promotes diseases of various kinds. The streets and houses in any city which will show the most deaths from scarlet fever, diphtheria, or Asiatic cholera, when such disorders are prevailing, may be *smelled out* by their atmospheric impurity. Uncleanliness of the skin acts in the same way to a less certain and serious degree. Neglect of the bowels leads to costiveness, headache, and dyspepsia; now and then it brings on a *hernia* (rupture) which may endanger life, or an *obstruction of the bowels* within the abdomen, from which not many who suffer it recover.

Contagion.

This is, strictly defined, conveyance of disease by touch or contact. But some (not all) disorders, which may be transmitted by actual touch, pass also to a short distance through the air. This is true of typhus, small-pox, chicken-pox, measles, scarlet fever, mumps, and whooping-cough, certainly; perhaps, in rare instances, of diphtheria. Hydrophobia, syphilis, and gonorrhœa are conveyed only by contact and *inoculation;* that is, introduction of the virus of the disease into the blood, or, at least, under the skin. These diseases, just mentioned, are

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the only diseases (except some very uncommon ones taken from animals) that are *certainly* contagious. Some others are supposed by many people, including a certain number of physicians, to be so; but a different explanation is more probably correct.

Infection: Atmospheric Causation.

Certain *places*, at particular *times*, are infected with maladies which attack a greater or less number of those living or visiting there. Some of these diseases are said to be **endemic**; that is, they are limited to quite clearly defined places. So, *ague* and autumnal bilious or *remittent fever* are found to prevail in some neighborhoods, every fall and spring; while other places, perhaps not more than a mile distant, are clear of them. *Yellow fever* is an endemic disease of the vicinity of the sea-coast of Cuba, while the higher regions of the same island are free from it. *Cholera* is endemic only in Hindustan, near the banks of the Ganges river.

When these, or any other diseases, overpass limited places, and either at the same time or one after another fall upon many localities, they are said to be **epidemic.** Yellow fever is often epidemic; ague and remittent fever but rarely so. Cholera, once in several years, starts out from India, and *travels*, mostly westward, over land and sea. Thus it has reached, in turn, nearly every part of the world except the cold polar regions, having even gone as far North as Finland and Northern Russia.

Atmospheric transmission or local infection is reasonably supposed to occur with the causes of these diseases, because it is chiefly through the air that human bodies can be influenced by the *conditions* of *places*. But it must be confessed that our knowledge of the causation of endemic and epidemic maladies is, as yet, imperfect. Some physicians believe *typhoid fever* to be always produced by a *personal* transmission of a specific poisonous material passing from the bowels of a patient having the disease. This dependence upon personal transmission I am quite sure does not exist. *Cholera* is thought by a large number of medical writers to be likewise extended only from person to person, the *contagion* existing in the discharges from the bowels. An overwhelming number of facts disprove this popular theory.

Plague was once universally, and is now generally, believed to be extremely contagious. The weight of evidence is in favor of its being only endemic, or *locally infectious*. Few physicians now consider *yellow fever* to be personally contagious. *Places* and *things* (ships, for example) receive, hold, and give out to susceptible persons, the "poison" which causes this mostly tropical disease.

Erysipelas and *puerperal fever* cannot be positively said *never* to be extended from one person to another. Transmission by cont- under

certain circumstances (which ought to be guarded against) has been repeatedly shown in regard to puerperal fever. But it is *generally* a local disease, especially likely to prevail in crowded, ill-ventilated hospitals. *Diphtheria,* likewise, is *sometimes* given by one person to another; the Princess Alice of Hesse, daughter of Queen Victoria, is supposed to have thus become the victim of a motherly kiss. Several physicians have lost their lives by breathing contagion from the throats of patients whom they were treating. *Usually,* however, diphtheria is either a local endemic or a slowly migrating epidemic disorder.

Influenza is always an epidemic; nobody imagines it to be contagious from person to person. The same is true also of *dengue,* the "break-bone fever" of our Southern States, and of a form of *dysentery* prevalent during the summer and autumn in some localities.

Among the possible and probable ways of explaining the causation of endemic, epidemic, and contagious diseases, the one which has received the most attention of late years is that which is called the "Germ theory of Disease."

THEORY OF DISEASE-GERMS.

Let us begin our study of this subject with an extract from a work by Ferdinand Cohn, a distinguished German botanist.

"Every one knows in how many relatively different sizes the life of the visible world embodies itself. The mites belong to the smallest creatures visible to the naked eye. They are found in numberless swarms in cheese, and in fruits rich in sugar. Their size compares to that of man about as a sparrow to the Strasburg cathedral. A similar comparison may be made between the giant fir tree and the moss which grows on its bark. Of the little animalcules that Leuwenhoek discovered, he stated that their size compared with the mite as the bee with the horse. The more the microscope has been improved, and its magnifying power increased, the smaller have been the beings that become accessible to keen observation, since among the animals and plants of the unseen world, a difference in size is found similar to that between the herring and the whale.

"But the smaller the organism, the simpler appears to be its form, the more imperfect its life energy, and the lower its place in the rank of created beings. Among the animals of the microscopic world, we find exceedingly few that possess the fulness of organs of an insect, a crab, or even a worm; the true infusoria stand on the lowest step of the animal kingdom. Even so we find among the microscopic plants not one that reaches the developed form of the blooming plant, or belongs

to even the lowest class of the ferns; only the lowest plant forms, which we usually designate as algæ and fungi, form the forests and meadows of the invisible world.

"But the more the inner formation of microscopic organisms is simplified, the fewer appear to be the characteristics which so easily separate plants and animals in the visible world. The infusoria are wanting in muscle and nerve, while vessels and breathing organs are very imperfectly developed. On the other hand, microscopic plants show independent movement, and even organs of movement, such as we are only accustomed to find in animals. In the very lowest organisms, animals and plants appear to run unto each other, and the naturalist is in doubt to which of the two kingdoms he shall assign the subject of his investigations.

"But the smallest, and at the same time the simplest and lowest, of all livings forms, we call *Bacteria*. They form the boundary line of life; beyond them life does not exist, so far at least as our present microscopic expedients reach; and these are not small. The strongest of our magnifying lenses, the immersion system of Hartnack, gives a magnifying power of from 3000 to 4000 diameters; and could we view a man under such a lens, he would appear as large as Mont Blanc, or even Chimborazo. But even under this colossal amplification the smallest bacteria do not appear larger than the points and commas of good print. Of their internal parts little or nothing is to be distinguished, and even their existence would for the most part remain hidden, did they not live in such gregarious masses. These smallest bacteria may be compared with man about as a grain of sand to Mont Blanc.

"If it is important on their own account to learn to know these smallest and at the same time simplest of organisms, then will our interest be increased through the knowledge that just these little forms are of the very greatest moment; since they, with invisible, yet irresistible power, govern the most important processes of animate and inanimate nature; and even seize on the being of man secretly, but at the same time fatally.

"The forms of the bacteria resemble sometimes balls or eggs, sometimes shorter or longer rods or fibres, and sometimes cork-screws or screws. The bodies consist of an almost colorless albuminous substance, in which numerous shining, fatty granules are imbedded,* and which

* Some of these granules have recently been found to consist of crystalline sulphur (CRAMER, COHN). They have been observed in *Monas Okenii*, *Bacterium Sulphuratum*, and in the different species of *Beggiatoa*, which latter are found most abundantly in thermal sulphur waters, where they play a great *rôle* in the elimination of sulphur, and the disengagement of sulphuretted hydrogen (MAGNIN).

is inclosed in a thin membrane (cellulose), insoluble in caustic potash. According to their form, we can distinguish ball, rod, fibre, and screw bacteria.

"Nearly all bacteria possess two different modes of life, one of motion and another of rest. In certain conditions they are excessively mobile, and when they swarm in a drop of water, moving amongst each other in all directions, they present an attractive spectacle, similar to that of a swarm of gnats or an ant-hill.

"The collective development of the bacteria makes it in the highest degree probable that they belong to the vegetable kingdom, and in nearest relation to the *Oscillariæ*. Bacteria also change from a condition of movement to one of rest, when they cannot be entirely distinguished from common plant cells. They swarm only where there is favorable temperature, plenty of nourishment, and the presence of oxygen; under unfavorable conditions they are motionless. Certain kinds of spherical bacteria appear never to move.

"A compressed yeast factory gives a plain example of the colossal proportions in which these little microscopic organisms can increase if abundance of nourishment is given them, and they are carefully protected from the opposition of other beings. The yeast fungus exceeds the rod bacteria in mass and weight probably 160 fold. The weight of a yeast cell is also about 0.000,000,25 milligrammes, or 40,000,000 of yeast cells weigh one kilogramme.* If they are in great vats filled with suitable food, and are allowed to remain undisturbed, inside of twenty-four hours over one hundred weight of yeast is generated. Probably there are more than fifty milliards of cells which form such a mass in the course of one day from one single grain.

"Bacteria belong to the most widespread of organisms; we may say they are omnipresent; they never fail either in air or water; they attach themselves to the surface of all firm bodies, but develop in masses only where decomposition, corruption, fermentation, or putrefaction is present. If we place a piece of flesh, a pea, or other animal or vegetable material in water, it will become, earlier or later, thick, and then milky. It loses its transparency, because the bacteria completely fill the water; at the same time the putrefaction increases, under the development of different, and for the most part bad smelling, chemical combinations. After a time the thickness disappears, and the water becomes clear and odorless, the organic material is consumed by the bacteria; these now cease to divide themselves further, and heap themselves on the bottom without motion as white sediment. If a new supply of nutritive mate-

* A kilogramme is a little more than two pounds.

rial be added to the fluid, putrefaction and the multiplication of bacteria, which are not dead, but in a state of temporary repose, are seen to begin anew."

What follows is taken from an article written by myself for a periodical designed for general readers: *

First, as these minute forms are so common, how can we ever get rid of them? The Italian Spallanzani ascertained, in the last century, that a boiling heat, followed by exclusion of the air, will prevent putrefaction in animal or vegetable materials. Count Appert, of France, applied this method many years ago to protect meat, vegetables, etc., from spoiling; and now, on the same principle, thousands of dollars are invested yearly in the canning of fruits, and, indeed, of almost all kinds of perishable food.

If a glass flask, open at the top, is filled with an animal or vegetable mixture, and then boiled (or even subjected for some time to a heat short of boiling), and the mouth of the flask is, while still hot, melted and sealed together, it is known, and may be shown by the microscope, that *no living bacteria* are contained in it. They are always killed by a high heat. But, without melting and sealing the mouth of the flask, bacteria may be, after cooking, kept out by a plug of *thoroughly cleansed cotton.* And, simpler still, in 1863, Pasteur, the most eminent investigator in this field, found it sufficient to soften the glass neck of the flask by heat, without melting it, and to *bend* it into a horse-shoe shape, with the mouth down. Gravitation in the atmosphere will then prevent particles, living or dead, from getting into the flask.

When it was discovered that shutting out all living minute organisms (fungi, bacteria, micrococci, spirilla, and spores) coincided with the absence of fermentation and putrefaction, nothing was more natural than to infer that these minute organisms are the *causes* of those changes whenever they occur.

Longest known has been the so-called alcohol ferment, yeast-plant, *torula* or *saccharomyces cerevisiæ.* This is always found present in yeast when examined by the aid of the microscope. Its amazing power of multiplication was mentioned in the account above extracted from Dr. Cohn.

More minute but exceedingly numerous are the vegetable organisms called *Schizophytes* or *Schizomycetes.* With these the true rod-like *bacteria* belong; as well as the spherical *micrococci,* and the curled or wavy *spirilla.* A *bacterium* (*b. termo*) is commonly believed to be the productive agent ("ferment") of putrefaction. The souring of milk, the con-

* *The Friends' Review,* Philadelphia, 1881–82.

version of wine into vinegar, and the slimy spoiling of wine, are all accounted for by different bacteria or fungi. What has been formerly called the "blood wonder," has now a similar explanation. It is the sudden formation of a blood-like deposit, spreading over bread or other food, and consists, as the microscope shows, of a rapidly multiplying red, spherical *micrococcus* (*m. prodigiosus*, Cohn). Litmus, so much used by chemists for testing acids, being obtained from a rock-growing lichen, exposed until it putrefies, is believed to owe its blue color to the action of bacteria.

Since these tiny organisms are so numerous that almost everything about us teems with them, we naturally ask, what are their actions upon human bodies? Do they, or some of them, produce diseases?

Before the time of Linnæus, two naturalists, one of them named Kircher, had suggested that very small living forms in the air or water might have to do with epidemic maladies. Linnæus himself took up the idea, in a rather crude form, without much basis of fact to sustain it.

Much more definitely, before the middle of the present century, several thoughtful physicians proposed a similar view. One of them was Prof. Henle, of Berlin; another, Sir Henry Holland, in England; a third, the late Dr. John K. Mitchell, of Philadelphia. In an eloquent lecture, which the writer of this article heard him deliver, Dr. Mitchell showed the probability that malarial fevers are in some manner caused by emanations from fungous plants. Twenty years later, Dr. Salisbury, of Ohio, asserted that he had found, with the aid of the microscope, the very plants themselves, which he called *Palmellæ*. Only last year, two European physicians, an Italian and a German, have given the name *bacillus malariæ* to a microscopic poison-plant of which they report the discovery in the Pontine marshes of Italy; to which they trace the fevers of that region.

Not designing to give here many particulars on this topic, we may just notice in passing that several minute living parasites have been for a considerable time known to do harm to men, animals, and plants. Examples are: ergot or "spurred rye," by which that grain has been sometimes made poisonous to numbers of persons in North Europe; potato rot, so disastrous often to the too-much-depended-upon crop of the Irish; muscardine and pébrine, two destructive diseases of the silkworm: these are all parasitic affections. So, besides pork trichina, and the itch (whose parasite is a little eight-legged *acarus*, related to the sugar mite), a number of skin diseases are ascribed to very minute and peculiar vegetations, recognized only by aid of the microscope.

Such disorders, however, are minor in importance, compared with the terrible infections and contagions, such as yellow fever, cholera, small-

pox, and diphtheria. What has the microscope shown us about them and their causation?

Were our readers altogether unacquainted with the subject, we should begin our answer to this question by discouraging high expectations. The inquiry is a comparatively recent one; only about half a century old as yet. It is, moreover, very difficult; requiring much skill in the use of the microscope, and extremely careful and patient work. Some sanguine scientists are ready to pronounce the "germ theory" proven absolutely. When we ask for precise facts, however, a good many of these simmer down to only probabilities.

Has any one demonstrated that small-pox has an "organism" as its poison-cause? No. Cohn gives a drawing of the "micrococcus vacciniæ;" but Dr. Beale, an equally good authority, denies its existence as an independent vegetation. Has any one demonstrated yet the "microbe" of cholera or of yellow fever? Not to the satisfaction of the majority of competent judges. Yet, within the last few years, medical books and periodicals, and lately even the newspapers, tell marvellous things of the *bacillus* of the fatal *anthrax* of sheep, and the *bacillus* also of leprosy, one of typhoid fever, and another of consumption (tubercle); *micrococci* of diphtheria, erysipelas, scarlet fever, and other disorders; a *spirillum* of relapsing fever, etc. Undoubtedly, able microscopists have seen in each of these instances minute forms which coincided with the occurrence of the diseases respectively. Have they proved that this coincidence means always causation? Some of the reasoning, *pro* and *con*, about this question may be worth a little further consideration.

Prof. John Tyndall, of London, a number of years ago, in performing some experiments upon light, made special observation of the multitude of particles floating in common air. A flash of sunlight in a room anywhere will exhibit some of these. Prof. Tyndall found that he could obtain "optically pure air" by exhausting a glass vessel by means of an air-pump, and then introducing into it other air which was filtered through cotton. He also repeated and modified the experiments of Pasteur and others, showing that air made optically pure in this way or otherwise will not promote fermentation or putrefaction. Meat or soup, first strongly heated (to kill "germs" in it) and then sealed up in such an atmosphere, will keep without taint for an indefinite time. Let in but a single breath of common air, and spoiling will go on at once; and then the microscope will show the presence of multitudes of rapidly multiplying *bacteria* or other *microphytes;* with usually, also, infusorial animalcules. Prof. Tyndall is a strong advocate of the opinion that similar minute organisms in the air and in water are causative of various diseases of men and animals.

We must select a few examples only to show the farther progress of this inquiry. A few years ago, Drs. H. C. Wood and H. Formad, of Philadelphia, began an elaborate investigation into the causation of diphtheria. Inoculating rabbits with particles from the throats of patients affected with that disease, they watched the resulting effects. Moreover, they examined the material so used before applying it, and found it to contain a great many minute organisms (bacteria, micrococci, etc.). The animals thus dealt with often became ill, and some died. For a long time, however, none of them were affected with anything resembling diphtheria.

At length, however, these earnest laborers in the cause of science obtained material from cases of a remarkably malignant epidemic of diphtheria, occurring in a distant locality. When rabbits were inoculated with this, diphtheritic symptoms, often fatal, followed. Examining the material having such effects very carefully with the microscope, they found many *micrococci;* exactly the same in appearance with those which, in their previous trials, had failed to produce such results. One difference, however, they ascertained. Putting them into an appropriate "culture liquid," the micrococci of *malignant* diphtheria could be made to reproduce their kind through a number of generations; while those of the *milder* epidemics died out in one, two, or three only. Drs. Wood and Formad hence propose the theory, that the micrococci are all really of the same species; but that, under circumstances important to be further looked into, they may *acquire* a malignancy in certain cases, which is not present in the ordinary type of the epidemic, or in what are called "sporadic" or occasional instances of the disease.

One of the latest of those pursuing these difficult studies, and the one who has produced the greatest sensation, is Robert Koch, a German physician. After many years of close examination and experimentation with tubercle (the material found in the lungs of consumptive patients, etc.), he has arrived at the conclusion that its cause is a tiny parasitic vegetation. This he exhibits by means of a delicate process of *staining* microscopic particles, so as to distinguish them from each other. His "bacillus tuberculosis" is small, indeed, for so mighty an effect as the production of so common and fatal a disease as consumption. It is but one-half or one-fourth the size of a blood-corpuscle; *i. e.*, one six-thousandth to one twelve-thousandth of an inch! So far, also, although very distinctly shown, there have but few of these been found in any one specimen of diseased human lung. Notwithstanding the flourish of trumpets announcing this discovery, it awaits confirmation by other competent observers before we can say that the actual and essential cause of consumption has been made known.

Let us now glance at some of the applications in practice of the theory of disease-producing microphytes. Prof. Joseph Lister (formerly of Edinburgh, now of London), about 1860, proposed that wounds, amputated limbs, and other parts of human bodies liable to *suppuration*, or to become places of entrance for blood-poisoning, should be protected from the atmosphere by "antiseptic precautions." These consist in the use of knives, ligatures, sponges, etc., dipped in a solution of carbolic acid; sometimes, also, a *spray* of such a solution thrown over the part during an operation; and dressings of wounds, stumps, etc., which are soaked in a similar preparation. The object of all this is to *destroy* and *keep out bacteria*, etc.; without which, it is held, neither suppuration nor blood-poisoning (septicæmia) can occur. Listerism, as this method is called, has now become common amongst surgeons in all parts of the world. Most of them have adopted it, and its advocates claim that better results follow great operations so managed than ever were obtained before.

But all leading authorities in surgery have not come to this conclusion. Callender, Lawson Tait, Spence, and others have saved the lives of as large a number of their patients without it as other surgeons with the whole routine of antiseptic surgery. What is certain is, that all such investigations have proved the deadly influence of *foulness*, in air, water, and clothing, on the human body everywhere; whether that foulness be poisonous of itself or only by means of the minute organisms which it contains. Hence the practical conclusion, which the successes especially of the non-Listerian surgeons establish, that the most necessary condition for recovery of a human body under wounds and operations is *absolute cleanliness* of everything in, upon, and around it. This Callender and the other surgeons named have maintained, and so their patients have done well without the carbolic acid *régime*.

So far, little has been said, in this brief narration, of Pasteur; the most eminent of all those engaged in this line of inquiry. A volume would be required to tell all that this great French chemist and experimental biologist has done and is doing; for he is still actively engaged, although getting old and in feeble health. His labors, more than any others, have settled (for our age at least) the question of *spontaneous generation;* that is, he has shown that life will never spring up in totally dead material without the previous presence of living beings; no life is without parentage. Pasteur also defended vigorously against the great German chemist, Liebig, the opinion that fermentation really depends upon the vital action of the yeast-plant, instead of being a purely chemical process, of which the *saccharomyces* is only an accident or a coincident. He is credited with saving vast amounts to the indus-

try of France, by his discoveries in regard to silk-worm diseases and their prevention.

Within a few years Pasteur and several other experimenters in England, Germany, and the United States, as well as in France, have been trying to find what can be done to prevent fatal diseases in domestic animals.

A very destructive malady of sheep, splenic fever (identical with *anthrax* or *charbon*) is ascribed to a minute *bacillus* (bacillus anthracis). Very much like this in appearance is the innocent *bacillus subtilis*, or hay-fungus. Now, Buchner, Pasteur, and others assert that, by cultivating the former of these bacilli in appropriate liquids exposed to the air, it changes its properties, and is converted into, or at least made to resemble, the latter, the innocent hay-fungus. If, then, a sheep is inoculated with this *modified* bacillus, a slight inflammation of the part of the body where it is inserted occurs, instead of the fatal splenic fever, and the animal is thereafter secured against an attack of the fever when exposed to its contagion. This has been verified on large numbers of sheep in France. Pasteur has had similar success with inoculation as a preventive of *chicken cholera*, and it is asserted, more recently, in regard to *hydrophobia*.

In the *American Naturalist* for March and April, 1882, Professor H. J. Detmers gives a full account of his investigation of *swine plague*, whose causation he refers to one of the *Schizophytes* or *Schizomycetes*. These are some of his conclusions:

"Every inoculation of healthy pigs which never had become infected with swine plague, when made with material containing swine plague Schizophytes, lung exudation for instance, produced the disease. . . .

"Inoculations with swine plague Schizophytes cultivated in an innocent fluid, such as fresh cow's milk, albumen of a hen's egg, etc., invariably produced the disease, though usually in a comparatively mild form. . . .

"Swine which survive an attack of swine plague and recover, possess afterwards either perfect, or what is more frequent, partial immunity from further infection."

Professor Law, in this country, and several veterinary authorities abroad, have obtained similar results with the *cattle plague* (rinderpest). All such facts remind us at once of Jenner's vaccination to protect against small-pox, which is justly considered the most valuable benefaction ever conferred upon mankind by medical art or science. Are we to have, hereafter, several other kinds of protective inoculation for human beings, on the same principle? We may hope for it; not without reason; but such a result is quite uncertain as yet.

Indeed, the whole inquiry is still incomplete, and the central idea of the "germ theory of disease" is only probable—not placed beyond doubt. Coincidence of two things does not necessarily prove that one is the cause of the other. And, if the general theory were accepted as proven, we should still need to study the different life-histories of all the schizomycetes or "microbes." We must know what conditions favor the presence and multiplication of each, so as, by removing these, to escape the invasion of the disorder produced by it. We must know also, if possible, what medicinal or other agencies will destroy each kind of poison-parasite within the body as well as outside of it.

Already important differences are known to exist in the propagation of epidemic and endemic diseases, concerning which, unfortunately, all physicians and sanitarians are not of one mind. Some call all such diseases *contagious*, from person to person, including yellow fever and cholera under that description. Others (among them the present writer) are very strongly convinced that neither of these two diseases has its cause, whether a "disease-germ" or not, formed in or given out from *the human body;* but that yellow fever is a disease of *places* and *things*, which give it to human beings brought under their influence; and that epidemic cholera flies like a cloud across land and ocean, from east to west around the globe. No railroad can hasten its speed, no sea (much more certainly no *quarantine*) can forbid its progress. It lights and stays where it finds material suited to its existence and increase; and, after a time, disappears for years or decades; possibly for centuries.

One thing, however, is clear. All these scourges of mankind which are, we may say in spite of our caution, *most probably* produced *somehow* by myriads of minute fungi or other organisms, are favored in their persistence, multiplication, and diffusion by *filth*. Filth is "matter out of place." Cholera, yellow fever, diphtheria, scarlet fever, typhus and typhoid fevers, all these and other diseases analogous to them, while *not caused by filth alone*, are invariably made worse by it. They come oftenest, stay longest, and destroy most lives in filthy cities, streets, ships, and houses everywhere.* Were all the world as clean as it might be made, "disease germs" would die out without either quarantine or Listerism; and the atmosphere, if not *optically* pure, would at least be too sweet to maintain any epidemics.

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* Autumnal or malarial fevers, remittent and intermittent, it must be noted, are exceptions to this statement, being essentially *country fevers*.

INFLUENCE OF TIME OF LIFE.

Infancy shows great delicacy of the *stomach*, irritability of the *skin*, and *excitability* of the *nervous system*. Its disorders are apt to be eruptions on the skin, and, in some children, soreness of eyes, nose, ears, and glands of the neck; diarrhœa, and, in hot summers, cholera infantum and convulsions. Measles, scarlet fever, whooping-cough, mumps, chicken-pox, and varioloid, or (in the unvaccinated) small-pox, are all most commonly met with in children. This is simply because few children escape exposure to them, and they do not usually occur more than once in a lifetime. Grown people may, and not infrequently do, have them, when happening not to be exposed to their contagion during childhood.

Youth is the period of *activity*. *Inflammatory* disorders are the only ones to which it is especially liable, except that pulmonary consumption often begins between the fifteenth and the twenty-fifth year.

Middle age ought, under good care of oneself, to be free from predisposition to disease. Now, however, any tendency *inherited*, or promoted by imprudence in youth, will be likely to show itself; as gout, insanity, cancer, etc.

The **old** show increasing debility and infirmity. Some aged people wither slowly away, like a tree or a bush in December. Others, instead, grow fat, but unwieldy, and less resistant, perhaps, than the lean ones, to increasing troubles. They are especially liable to *fatty degeneration* of the heart, liver, etc., and to apoplexy. All old people are, more than young ones, subject, under disturbing causes, to urinary troubles, dropsical swellings, and catarrhal affections of the bronchial tubes and lungs.

Although the **causation of special diseases** will receive attention in our account of them later in this volume, a brief allusion seems fitting here to that of a few of the most important, and in which most people are interested.

MALARIA.

This word, from the Italian, meant originally *bad air*, generally. Physicians, however, of late years, have commonly applied it to the supposed atmospheric cause of *ague* (intermittent) and *bilious* (remittent) fevers. These are especially diseases of the fall of the year, but in some places they occur also in the spring. Persons who have once taken

ague (also called *chills*, or *chills and fever*) may, if it is not properly treated, continue to have it all through the year, summer and winter.

The main facts, about these affections, which bear on their causation, are these:

1. Malarial fevers are always *local* in their prevalence, having certain bounds even when epidemic.

2. They never prevail in the *thickly-built* parts of *cities*.

3. A mean summer temperature of at least 60° is necessary to their development; a continuance of *decided warmth* for more than two months being required.

4. They are most common and most severe in *tropical* or nearly tropical climates. Yet some regions, in which the summers are both hot and long, are exempt from them.

5. They prevail *least* where the surface of the earth is *rocky*, and *most* where the soil is loaded with *organic matter*.

6. The existence of *surface-water* favors their development. They haunt chiefly the borders of marshes, shallow lakes, and slow streams, but not exclusively.

7. Those dwelling upon the *shores* of large lakes are more subject to them than those who navigate their central waters.

8. The neighborhood of the *sea* is comparatively free from them, unless inland *marshes* lie near it.

9. In the midst of unbroken *forests* they are *rare*, but are apt to follow the *clearing away* of woodlands.

10. Heat and moisture sometimes exist together (as on the Gulf of Mexico) without (other conditions being absent) producing these fevers.

11. Draining dams or ponds, or other exposure of surfaces before covered with water to the sun, has often been followed by fever. So has the first cultivation of a new soil; but continued culture is followed by a diminution of malarial disease.

12. Some seasons are healthy, and others unhealthy, in the same place, without any observed difference in its conditions, except that early heavy rains, followed by drought late in the summer, are apt to presage an unhealthy autumn.

13. A decidedly hard *frost* always puts an end, for that season, to the danger of exposure to malarial influence in the region where it occurs.

Nearly all these facts point to the *probability* that an organic cause, of a vegetable nature, produces these fevers. Notwithstanding, however, all the inquiries of Morsen, Salisbury, Tommasi-Crudeli, and others, we have not yet a complete *demonstration* of this subtle "disease germ" which has the power to impair the health of thousands of people in our own and other countries.

Important *preventive* measures may be deduced from the known facts concerning malarial fevers.

1. Avoiding localities, known to be subject to them, *from frost to frost*, but especially between the middle of July and the middle or end of October, will secure immunity.

2. Never going out upon or through a malarious place within *two hours after sunrise* or *one hour before sunset* (as well as, of course, not being there during the night) is an important precaution.

3. Even in a malarious district, burning *a fire in the house on every damp day*, even in Summer, and all through the *early Fall* and *late Spring*, will, as I know from observation, contribute much to the escape of residents from Ague and Remittent Fever.

CAUSATION OF YELLOW FEVER.

Leaving for a later part of this book our *description* of this disease, we may here notice only the most prominent facts concerning its prevalence.

1. All the places in which yellow fever ever has really *prevailed*, that is, where it has occurred in persons not *brought* to those places already *ill*, are upon or not far from the borders of the **Atlantic Ocean** and its connected seas, the *Gulf of Mexico* and the *Western Mediterranean*. Thus it **never** has been an endemic or epidemic on the Pacific Coast of America, nor has it ever been seen at

Canton, in China;	Bombay, India;
Calcutta, in India;	Alexandria, Egypt;
Athens, in Greece;	Constantinople, Turkey.

Nor has it been known at any of the *interior* cities of Europe, as Rome, Vienna, Berlin, Dresden, Munich, Brussels, Paris.

Often, yellow fever has prevailed on the

West Coast of Africa,	New Orleans,
North Coast of South America,	Mobile (formerly),
West India Islands,	Savannah,
Vera Cruz, etc., in Mexico,	Charleston.

Occasionally, it has been known at

Rio Janeiro,	Gibraltar,
Natchez,	Marseilles,
Vicksburg,	Barcelona,

Memphis,	Cadiz,
Norfolk,	Malaga,
Richmond,	Seville,
Baltimore,	Xeres,
Philadelphia,	Carthagena,
New York,	Leghorn,
Boston,	Sicily, etc.

2. Yellow fever only occurs in any place when there is **continuous warm weather** (usually 80° Fahr. for a month or more); most generally, also, a good deal of *moisture* in the air. Like malarial fevers, it always ceases with a good hard frost.

3. It is a disease chiefly of *sea-ports*, or of *towns* on *large rivers connecting with the sea.**

4. It is promoted especially by **vegetative decay**, as decaying wharves, newly upturned soil, cargoes of rotting potatoes, etc.

5. The infection of yellow fever has mostly rather narrow **limits**; often they may be marked out in *fractions of a mile.* So it was in its visitations in Philadelphia; certain *streets* and *blocks of houses* only were infected; all who kept away from these were safe from the disease.

6. It is **not personally contagious**; that is, the cause of the disorder is not formed or multiplied in the bodies of those suffering with it; only outside of them.

7. It is **seldom, if ever,** conveyed by clothing, bedding, merchandise, etc. Still, the *possibility* of such conveyance affords reason for precautions concerning railroad cars, steamboats, baggage, etc.

8. **Ships** sometimes transport it, by carrying in their holds a quantity of *infected air and foul materials* from infected places. This fact justifies *ship* quarantine under certain circumstances.

9. But, when thus carried, *no extension* of the disease ever follows, unless the place to which an infected ship comes has the **promotive conditions** of *high heat, moisture,* and *foulness from decay* abounding in it.

10. Thorough **cleansing,** *airing,* and *disinfection* of ships, steamboats, railroad cars, clothing, and merchandise (*except rotting vegetable matters*) will always deprive them of the power of generating or extending yellow fever.

11. **Removal** of the population of a place infected with yellow fever will certainly always put an end to the prevalence of yellow fever among that population.

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* I believe that this fact, or at least the prevalence of yellow fever only on or near the borders of the *Atlantic Ocean* and its connected waters, was first pointed out by myself. It is not generally referred to in books on the subject.

12. *Personal detention* at quarantine, of either sick or well persons arriving on a yellow fever vessel, or coming from a place where it prevails, is **of no use at all**, since the disease is not personally contagious; and it is often a cause of much inconvenience and distress. Still worse is the barbarous and inhuman "shot-gun" quarantine on land, for which there is *no reason or excuse whatever*.

CAUSATION OF CHOLERA.

About this, we must remember the difference between common *cholera morbus*, which may occur anywhere and at any season (though most common in summer) and *epidemic*, often called *malignant* or *Asiatic cholera*.

This last disease is endemic, every year, only in India. There the circumstances are remarkable. The Delta of the River Ganges is overflowed every year by the rising and swelling of the river during the rainy season, over a width in some parts of more than a hundred miles. Much of this, in the dry season, is uncovered again, but always damp, and under a tropical sun. Large numbers of animals are drowned during the river-flood, and their bodies decay afterwards, giving off foul emanations. Superstition also leads the Hindoos to throw their dead into the Ganges, as "the gate of heaven." The habits of the people about their houses are very uncleanly. All sorts of products of **animal decay** abound everywhere. This seems to be the great *promotive* cause of cholera. There must also be a **specific** cause (germ?) for it; but that has not yet been certainly found.*

Physicians and others resident in India do not, as a rule, think of cholera as being contagious from person to person, in any way. It prevails at a certain place; avoid that place, and you are safe from it. An army encamped is attacked by cholera; the commander moves his soldiers to a higher and more open, healthy place, perhaps not more than a mile or two from the first camp, and no more cases occur.

All the history of this disease shows the importance of **animal filth** (human and other, living and dead) in maintaining and extending it.

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* Dr. Robert Koch, a German investigator, asserted his discovery (1883–84) in Egypt and India of a very minute "disease-germ" (*bacillus*) which he believed to be the cause of cholera. But, as in the case of the same sort of causation of consumption, it remains to be positively shown whether the presence of the *bacillus* is a *cause*, or only a *coincidence*. Careful examination of the evidence, *pro* and *con*, convinces me that Koch's "comma bacillus" is *not* the specific cause of cholera.

Its mortality has been greatest in Moscow, Paris, Marseilles, Liverpool, Manchester, Edinburgh, New York, etc., and worst of all, in the *filthiest parts* of those and other cities.

Yet it does not *depend* on human intercourse for its migration over the world. It may pass from one town to another without affecting another town, lying right between and on the way. Most striking of all, it has several times attacked *ships far out at sea*, when there was *no cholera at all* at the ports from which they sailed.* No explanation exists for such facts but that the mysterious epidemic cause travels as a "cholera cloud," over sea and land, lighting and staying where it finds (like a cloud of insects or a flock of birds) material to feed upon. Such material is always present where men live in close houses, with foul cellars, yards, streets, slaughter-houses, graveyards, etc.

Most plainly, *bad drinking* water has been shown to increase the number of victims of cholera. So much has been made of this, that the current popular theory of the extension of the disease (outside of India, where they can see it plainly otherwise) is, that the specific cause is *only* conveyed from person to person and from place to place by the discharges from the bowels of those having the disease. I am altogether satisfied (after a good deal of study of the subject, during three epidemics, 1849, 1854, and 1866) that this theory is *not true*. *All* fecal discharges, and *all* foul water, foul air, everything that is foul, promotes cholera; the excrements of a patient with it are no worse in this respect than any other foulness.

Not being contagious, then, quarantine against cholera is of no use at all; while detaining persons at quarantine in an infected vessel has repeatedly cost *scores of lives*. Foul *ships* ought to be cleared at once of their passengers as soon as they reach a port; *they* cannot give the disease to any one, wherever they may go. The *worst possible* thing is to detain them in an unhealthy steamer, or whatever it be, on which cholera has prevailed during the voyage. *Personal* detention at quarantine, in fact, has no excuse in connection with *any* disease. It might perhaps have for small-pox, but that the true and efficient preventive of that is universal vaccination.

Cholera is to be prevented by cleanliness, *cleanliness*, cleanliness! That one word sums up all there is about it.

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* I have given a full account of these facts in my little book, "Cholera: Facts and Conclusions upon its Causation, Nature, Prevention, and Treatment." Philada., 1866.

CHOLERA INFANTUM.

We have said so much in our pages on the **Hygiene of Infancy**, upon the summer care of children, that it is needful now merely to recapitulate the main particulars in regard to the causation of "summer complaint."

These are three: **high heat** (90° to 99° or 100°); the **foul atmosphere** of large cities; and **improper food**, especially milk not sufficiently fresh. Symptoms of this disease, and its domestic management, will be considered later in this book.

DIPHTHERIA.

Although known to the ancients under other names, and at considerable intervals several times visiting Europe and America, the prevalence of this disease in the United States has much increased since 1856. Rather more obscurity exists as to its causation than in regard to most other diseases. Some facts, however, are clear.

1. Diphtheria is generally a **local** disease; that is, infecting certain towns, villages, or houses, at particular times.

2. It may be taken by one person from another, but only upon **contact** or **close** approach.

3. **Foul air**, from filth, bad drainage or ill ventilation, contributes very decidedly to its prevalence and to the mortality resulting from it.

NATURE OF DISEASES.

Children sometimes die of old age. That is, their *original endowment of life energy* was so small as to be exhausted during infancy.

Others die very soon because of some *defective development of a vital organ* or organs. *Monsters,* now and then, are met with, born without a head or without a heart, etc. *Spina bifida* is what physicians call a *cleft spine;* the usual natural bony covering of the spinal marrow not being perfect. Most of those born thus die within their first year. *Cyanosis,* the blue disease of infancy, is not always fatal, but is generally so; the dark color resulting from the blood not being *arterialized* properly; this being due to an imperfect development of the heart or of one of its great vessels (pulmonary artery).

At any period of life the disorders to which we are all subject consist in one or both of the following changes:

1. Disturbance of the *action* of some organ or organs by a morbid cause.
2. Alteration of the *structure* or *substance* of one or more organs; inducing, of course, change also in its action.

To the first of these the term "functional disorders" is applied; those of the second sort are "organic diseases." *Temporary* changes in the substance or structure of an organ often occur, as when it is *inflamed,* from which there may or may not follow permanent organic alterations.

Only *slight* affections of even small parts of the body can take place and last for any time, without involving the general system more or less in disturbance. Also, a disorder beginning in the blood, and thus being a *general* malady, nearly if not quite always puts some of the functions of the organs out of order. Still some cases do begin in, and chiefly affect, particular organs; these we call **local** disorders; others begin in the blood, and involve the body in many of its functions; those are well described as **general** diseases. We will give attention here, first, to the nature of the disturbances coming under the former of these heads.

LOCAL DISORDERS.

Medical books speak of **irritation, congestion** (*hyperæmia*), **inflammation, mortification,** and **degeneration,** as affections of organs of the body. **Atrophy, hypertrophy,** and **morbid growths** are such also; and less purely local, but often more or less restricted, are **dropsical effusions.**

Irritation.

An eye is *irritated* when a spark from a locomotive, or a bit of sand, or an inverted eyelash, gets into it. A mustard-plaster first stimulates the circulation of the skin where it is applied; this may be quite within the bounds of healthy action, if the mustard be soon withdrawn. If it remain longer, *irritation* is shown by *pain* and *soreness;* next, if still allowed to act, it will produce *inflammation.* Irritation of the stomach may be caused by indigestible food, or, more serious in degree, by certain poisonous substances; as strong acids, alkalies, arsenic, or corrosive sublimate.

Hyperæmia.

The older name for this is *congestion.* It may be an *active* flowing of more blood than common *through* a part, or a *passive* collection of blood *in* the part. Stimulation produces the former; when it passes beyond the line of health into irritation, passive congestion occurs at the centre of the irritation, active congestion in the parts around it. Determination of blood towards any portion of the body may be, when very decided, called *local hyperæmia.* A *bloodless* condition of an organ is called a local *anæmia.* The first simply means *excess* of blood; the second, *deficiency* of blood.

Inflammation.

All the world knows when a hand, a foot, or an eye is *inflamed.* Proverbially, the signs of this are *redness, heat, pain,* and *swelling.* The redness is owing to the excess of blood; the heat to the same cause, with also probably some increase of chemical change in the part. Pain is not quite so clearly to be accounted for. Pressure on a nerve is known to cause pain; and the excess of blood beating on a part at whose *centre* is *stagnation,* must induce considerable pressure. Nerve-pain (neuralgia), however, often occurs without inflammation and without pressure. Some one has wisely said that pain is always a sign of a tendency in the part towards death. It is, at least, indicative of *lowered vitality,* local or general; and that is present at the *centre* of an inflamed organ, while *around it* there may be the heightened activity of stimulation. In a *boil,* and yet more fully in a *carbuncle,* we see the *dead centre* (core) of the violent inflammation, when its force is nearly spent.

The *swelling* of an inflamed part is also due in considerable degree to the accumulation of blood in it. But, under the pressure of the heightened circulation, some of the *lymph* (watery portion) of the blood escapes from the blood-vessels into the substance of the part. Some of the *corpuscles,* especially the colorless, or *white corpuscles* (leucocytes)

also, in some cases, pass through the walls of the vessels. Then the *effused lymph*, with or without corpuscles, undergoes changes, which are important.

An active or *acute* inflammation may end in several ways:

1. **Resolution** is the early passing off of all the inflammatory symptoms, leaving almost no sensible change in the part.

2. **Effusion of lymph,** not at once absorbed, shows itself in bands which glue together tissues naturally movable, or in a collection of fluid (serum), constituting a form of local dropsy. In an attack of *pleurisy*, both of these results may follow instead of resolution.

3. **Suppuration** is the formation of *pus;* that is, yellow matter, which is very seldom absorbed, and whose best destiny is to be got out of the

FIG. 173.

INFLAMMATORY LYMPH-BANDS.

body by an opening, natural or artificial, at or near the external surface. Every "gathering" or abscess is an example of this. *Pyæmia* is a general disorder of the system, with a disposition towards the formation of collections of pus in different organs, with fever and much weakness, endangering life.

4. **Mortification**, also called *gangrene*, or *sloughing*, is the actual *death* of the part. Frozen feet mortify, not from inflammation, but from the directly killing effect of cold. Inflammation does not often end in mortification; if it does so, it is either from the extreme intensity of the inflammatory process, or from a very low vital condition of the patient affected.

Inflammation is modified considerably by *specific causes* of disease. A gouty toe is one example of this; a wrist or elbow inflamed with rheu-

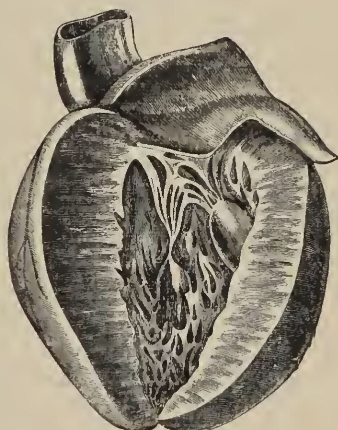
matic fever is another. The sore throat of quinsy, that of scarlet fever, and that of diphtheria, are all *inflammations*, yet each somewhat different from the others. The pustule of vaccination and that of genuine small-pox are not *precisely* alike; and still different is that of chicken-pox; and so on with other *specific* diseases.

Chronic inflammation is not a desirable term, though it is used in all medical books. In it, redness, pain, or at least *soreness*, and more or less swelling, are present, in varying degrees; but there is no *effusion of lymph*, which really is the characteristic of a true inflammation. *Irritability* is a usual part of what is called chronic inflammation; we might often with advantage speak of this in describing the disorder: thus, *irritable eyes, irritable stomach, irritable bladder, irritable womb, irritable brain*, etc.

Hypertrophy.

Overgrowth is the meaning of this word; increase in size without essential change in the nature of a part. An organ may *enlarge* very much, with a great change in its character; for example, a tumor of the breast, or a dropsy of the head. Again, an organ may be stretched or *dilated* without even an increase of its substance.

Fig. 174.



HYPERTROPHY OF THE HEART.

The *heart* exemplifies two of these changes in different instances. If one of its valves through which the blood passes becomes obstructed from disease, the heart has to *labor* more than usually to compel the blood to pass by the obstruction. Like other muscles (the heart being really a hollow muscle), this extra labor may have either of two results, according to the conditions present. If the person's constitution be strong, and his blood well nourished, the much-worked heart will grow thicker and more powerful with the exercise. This is *hypertrophy*. But, if the contrary be the case, with a feeble system and poor blood, the heart is weakened by its excess of labor, and it stretches or becomes thin (attenuated) and *dilated*.

The thickening of the skin of a workingman's hands shows an increased growth from habitual rough usage. A *corn* is a hypertrophy, and so is a *wart;* both involving almost entirely the outer skin or cuticle. *Wens* and *pimples* show a greater change of substance with enlargement.

Atrophy.

This is the opposite of hypertrophy. Want of blood or of the supply of nervous energy will cause an organ to shrink away. So a palsied hand often, in time, withers to half its original size. Atrophy occurs naturally, all over the body, with old age. First the fat is absorbed, then the muscles, and afterwards other parts, until the "well-shrunk shank" is far within the "lean and withered pantaloon."

Degeneration.

Instead of lessening in size, however, from loss of life-force, an organ may grow larger, with *change of substance.* This is *organic degeneration.* The substance taking the place of the natural tissue of the part is always *inferior in character* to that tissue. Thus *fat* may take the place of *muscle,* as in "fatty degeneration of the heart." Or bone-like material may form in place of the proper substance of the arteries; making "ossification" (calcification) of those vessels. Or the liver or kidney may be enlarged, the normal cells of either organ being replaced by a material like the areolar ("cellular") tissue of the surface of the body under the skin. Tubercle, of the lungs or other parts, is essentially a kind of degeneration; although it often (not always) follows attacks of inflammation. Acute and chronic inflammation of various organs is frequently followed by *hardening* or *softening;* both of these being modes of degenerative alteration.

Dropsy.

Seldom does an accumulation of water occur in one part of the body without some previous general disorder of the system, or at least an affection of some of the great organs: the *heart, liver,* or *kidneys.* We do sometimes meet with "white swelling" of the knee; but nearly always there are also signs of a "scrofulous" constitution to predispose to it.

Inflammation may, however, cause an effusion of serum, which remains after the acuteness of the attack has passed. The simplest illustration of this is seen in a *blister.*

Suppose mustard to be applied to the skin; as mentioned already, when referring to irritation, etc. First, we see **stimulation,** shown by redness and heat, with very little if any swelling, and no pain. Next, **irritation,** with soreness and pain, perhaps quite severe; then **inflammation,** followed by **effusion,** which raises the skin with what we call a "blister."

So, also, when the *pleura,* which lines the ribs and wraps the lungs,

is inflamed, it throws out in a few days more or less lymph as an effusion. If this is *copious* in amount, it presses the lung away, and interferes with its expansion in breathing. This is sometimes so serious a trouble as to induce physicians to *tap* the chest and draw off the water to relieve the oppressed lung. Likewise, inflammation of the covering of the heart (*pericarditis*) may result in a serous effusion within the pericardial sac, clogging the heart so as not infrequently to cause death. *Hydrocephalus*, or water on the brain, may originate in a similar way.

Dropsy of the chest, however (*hydrothorax*), dropsy of the head (*hydrocephalus*), dropsy of the abdomen (*ascites*), and general dropsy (*anasarca*), are much more often brought on by obstruction of the circulation, with thinning of the blood, from disease of the *liver*, *kidneys*, or *heart*, or two or more of those organs at the same time. *Ovarian* dropsy attends a ("cystic") disease of one or both of the ovaries.

Œdema is a watery swelling of a part of the surface of the body or limbs.

Emphysema is a puffiness of the skin, or lungs, from accumulation of *air* in the cellular substance of the part affected.

Mortification.

When a *part*, as a toe, a whole foot, leg, or arm *dies*, while the rest of the body lives, it is said to *mortify*, *slough*, or suffer **gangrene.** Once in a while the feet of an old person may undergo slow and dry gangrene. When an artery, as that of an arm, is plugged up by a clot (*embolus*), the arm is apt to mortify in consequence. Frozen feet or toes often die and slough off. Sometimes, especially in ill-ventilated hospitals, stumps of amputated limbs, and wounds of various kinds, *slough* instead of healing (hospital gangrene). Quite rarely, *sore mouth* in children may become gangrenous; and even a lung, or a portion of it, may become the seat of gangrene. In the last case, the patient is almost sure to die.

Mortification of a part is always more or less dangerous to the life of the whole body in two ways. First, the sloughing process may *extend* gradually from the part affected towards the centre of the body; and thus, *involving vital parts*, it may become fatal. Or dead matter from the gangrenous portion may be *absorbed by the vessels*, and so *poison the blood* (*septicæmia*) in a manner seldom recovered from.

When mortification is confined to a small part of the body, as a frozen toe or finger, the rest of the system being in a healthy state, a *line of demarcation* naturally forms, separating the dead from the living tissues. In some cases, a surgeon will then consider it best to hasten and com-

plete the process, by *removing* the sloughing part, by an operation. In other instances, the dead parts will drop off, leaving a surface which will gradually heal.

Morbid Growths.

Warts, corns, bunions, wens, moles, bony enlargements, fibrous and fatty tumors, are all unsightly, and the last named may be considerably inconvenient. But they do not of themselves tend to undergo such increase or morbid changes as to be dangerous to life. They may therefore, by comparison, be called **innocent** growths.

Malignant tumors are generally included under the name **cancer.** They tend to grow indefinitely, at the expense of the neighboring parts and of the general system. They often change their character, becoming open, discharging, offensive sores; the seat, moreover, generally of severe pain. At last, the whole body of a cancerous patient becomes unhealthy; and the end, after various periods, is death.

Cancers may be either *schirrus, colloid,* or *encephaloid.*

Schirrus is *hard* cancer.

Colloid is jelly-like.

Encephaloid is soft, almost like brain substance.

The parts of the body most liable to be attacked by cancer (especially after middle life) are the *womb,* the *female breast,* the *stomach,* and the *lower bowel* (*rectum*); but various other organs are sometimes invaded by it. *Schirrus* is most apt to be met with in the *breast, stomach* (*pylorus*), or *bowel; colloid,* in the *stomach, bowel,* or *covering* of the bowels (*mesentery, peritoneum*). *Encephaloid* may occur in any organ; it is the only kind ever seen in the *eye, liver, kidney, lung,* etc.

Epithelioma will be spoken of on page 721.

GENERAL DISORDERS.

We may name these as **debility, anæmia, plethora, cachexia, neurataxia, toxæmia,** and **fever.**

Debility.

One is apt to feel *weak,* when anything whatever is the matter. But there are different sorts of weakness. A soldier bleeding from a wound, is weak from *loss of blood.* An overworked man or horse is ready to drop, from *excessive fatigue.* One who has had typhoid fever for three weeks is feeble from *continued illness.* All these are examples of **exhaustion.**

But, again: a *railroad car* runs over a man's leg, or he is *burned* over half of his body, or has *fallen* from the top of a house to the ground, or has been terribly *frightened,* about himself or some one else. Either of these causes will or may, by its *shock,* cause **depression** or **prostration,** of which the extremest degree is called *collapse.*

Thirdly, everybody is "weak" who has taken a very *heavy cold,* or who has an attack of *measles, scarlet fever, small-pox, intermittent, remittent,* or other *fever.* In the beginning of all such affections, the weakness is that of **oppression.** The organs of the body are *clogged,* so to speak; skin, kidneys, bowels, etc., are, for the time, hindered in their action, and the loaded blood fails to stimulate aright the various functions.

These states may be illustrated by a comparison. *Exhaustion* is like the running down of a clock. *Depression,* like arresting for a time the movement of the pendulum. *Oppression,* like something getting into the works, which does not stop their motion, but obstructs and alters it so that it goes out of time. We remedy the first of these by *winding up* the clock; the second, by *starting the pendulum* again; the third, by *removing the obstruction* from the works. So it is important, in *treating* debility, to distinguish of what kind it is. *Exhaustion,* as after long illness, is to be recovered from, with time, under *nourishing food, rest, pure air,* etc. *Depression,* or prostration, as from a severe shock, by *warmth, rest,* and *stimulation,* according to the nature and degree of the case. *Oppression* of the organs, at the onset of a disease, is best relieved by *unloading* the system, by purgative medicines, and those which promote the action of the skin and kidneys; sometimes, in an early stage, by the withdrawal of blood from the arm, or by leeches or cups from a central part.

Anæmia.

Poverty of blood is what this word means. It may result from various diseases, or from loss of blood, too long nursing, etc. Weakness accompanies it, of the kind above called exhaustion. An anæmic person is usually pale (though perhaps easily flushed by excitement), rather thin, and "nervous." In women, such a condition is apt to be attended by monthly irregularity. There is a form of it called *progressive pernicious anæmia,* which cannot be accounted for by ordinary causes, and which (unlike simple, common anæmia) it is almost or quite impossible to cure by any treatment. Another serious affection of the blood is *leukæmia,* of which we will speak in another place.

Plethora.

This is the opposite of anæmia. In it, the red corpuscles of the blood are too numerous, and the blood itself is redundant in amount. A plethoric person is round and plump (not necessarily *fat*), with full blood-vessels and a high color. Such an one is more liable than others, in early life, to *acute inflammations* and *active hemorrhages;* after middle age, to *apoplexy.*

Cachexia.

By this we mean a *bad habit of constitution.*

Leukæmia * (or leucocythæmia) is a disease in which there is an *excess of white or colorless corpuscles* in the blood.

Another *cachexia* is *scurvy* (scorbutus); brought on by deficiency of fresh food; especially vegetable food.

Another is *goitre* or *bronchocele;* whose main feature is a swelling in the neck, involving the thyroid gland. With this, in Switzerland, there is often *cretinism;* a depraved constitution in every way; stunted growth, mental imbecility, and general weakness.

Chlorosis, or "green sickness," is a cachexia sometimes met with in girls or young women; the name is given because of a peculiar sallowness of complexion belonging to it.

Rickets occurs tolerably often among the ill-fed poor in the cities of Europe; much more seldom in this country. Those having it are feeble from childhood, with defective development especially of the bones; which are easily broken and subject to decay.

Tuberculosis is the constitutional affection of which consumption of the lungs is the most familiar manifestation; but it often also affects the bowels, brain, and other organs. *Tubercles* are the small, irregular,

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* Something more will be said of each of these affections in a later part of this book; under Special Diseases.

roundish deposits found after death in the place of healthy tissues; which, however, frequently soften, leaving *cavities*. *Tubercular meningitis* is the name given to an almost always fatal form of inflammation of the membranes of the *brain*, in children.

Scrofula is an old designation for a constitutional tendency showing itself, early in life, by swelling of the *glands* of the neck and elsewhere, *sore eyes, sore nose*, running at the *ears*, and sometimes inflammation and decay of the *bones* of the limbs, or "white swelling" of the knee. Cheesy matter is found in scrofulous glands, which closely resembles the tubercle of some consumptive lungs. Many physicians believe, I think correctly, that *scrofula* and *tuberculosis* are essentially varieties of the same cachexia. Its characteristic is, a tendency to *slow* and *obstinate* inflammatory affections of different organs of the body, with *deposits* of formless material, more or less cheese-like at first, but disposed to soften

Fig. 175.

TUBERCULOUS LUNG.

(occasionally, however, becoming *chalky* instead) and to cause abscesses (gatherings with pus) around it.

Diathesis is another word used at times with very nearly the same meaning as *cachexia*. So, we may say, that the diathesis now mentioned, which is often inherited, involves generally in childhood the *glands, mucous membranes* (of the nose, ears, eyes), and *bones*, making what is called *scrofula*; or, at the same period, the *brain*, with "tubercular" or scrofulous meningitis; in youth and early middle age, the *lungs*; producing *phthisis*, that is, consumption of the lungs. There is good reason to be sure, however, that tubercular consumption may occur and go on to a fatal end without depending upon any *inflammation* of the lungs to begin it; being simply, from first to last, a destructive general and local *cachexia*.

Neurataxia.

I have coined this word (from *neuron*, a nerve, in the Greek, and *ataxia*, irregularity) to signify **nervous disorder.** *Neurasthenia* has been much spoken and written about of late years, meaning *nervous debility.* The latter, debility, does very often predispose to and *produce* disorder of the nervous system; but the other term is wanted because an amount of *irregularity* in the nervous functions may and does often occur quite out of proportion to the weakness present; indeed sometimes in those who can scarcely be said to be in a condition of marked debility.

Hysteria is the most common descriptive word for various *ataxic* (unbalanced, out of order) nervous symptoms. It covers not only what are known as "fits of hysterics," but also a great many *freaks* of disease, of body and mind, well known to physicians. Among special diseases, hereafter, we may consider more particularly *epilepsy*, infantile and other *convulsions, lock-jaw*, etc., as disorders of the nervous system.

Toxæmia: Blood-poisoning.

An old saying is that "the blood is the life." Everything that ever makes part of any organ of the body must reach its place therein through the blood. And all that exists to-day in the solid structure of our frames will, some day or other (unless it be on the skin or some surface connecting with the outside), dissolve in the blood, to be carried out and away. Moreover, every beat of the heart, every drawing of breath, every thought flashing through the brain, needs a supply of *pure blood*, that it may be done rightly and well.

Blood-poisoning, then, can never be a trifling thing. We would be in deadly danger of it every day, but that so much is arranged in our bodies not only to prevent it, but to *relieve* it promptly when it begins to take place. Indeed, each particle of *used-up matter*, which has served its purpose in any organ, *becomes poisonous* the moment it gets into the blood. But then, at once, the *lungs, skin, kidneys*, and *bowels*, with help also from the *liver*, take from the blood these dead particles, and carry them out, in the *exhaled breath, perspiration, urine*, and *excrement.* Thus we are safe, although, most literally, "in the midst of life we are in death."

If, however, either of these blood-purifying processes is *stopped*, or much obstructed, real danger comes. Waste material collects in the blood, and the organs, thus badly supplied, work badly. There are several forms of blood-poisoning. One is *uræmia*, from suppression of the action of the kidneys; another is *cholæmia*, from non-secretion of bile by the *liver.* Another might be called *sapræmia*, from retention

of putrefiable matter not carried off by the bowels; but that word is otherwise used by some writers.

All these are forms of blood-poisoning *from within;* that is, by matter formed in the body. Next to these may be named *septicæmia,* produced by the *absorption* of foul material from a *surface* of the body, or near it; as from a gangrenous wound or an unhealthy abscess; or from the unremoved "lochial" discharges following child-birth. *Pyæmia* is the term applied to such poisoning when it is followed by a deposit of pus in various parts of the body.

Uræmia, unless relieved (towards which the skin always does a friendly part for the kidneys), is fatal usually in a very few days. *Cholæmia* seldom shows such destructive power, but is manifested by dizziness, sickness of stomach, headache, bitter taste in the mouth, and yellowness of the skin, tongue, and eyes.* *Obstruction of the bowels* causes blood-tainting by non-removal of putrescent material through their secretion; thus, and by other means, it kills commonly in a week or two, unless some means of relief be found. *Septicæmia* and *pyæmia* will be treated of hereafter by themselves.

Outside poisons reach the blood through the mouth and stomach, by the lungs, or by the skin. Not now considering gross poisons (such as arsenic, corrosive sublimate, etc.), we refer here to those of a subtler nature, as *bad drinking-water, malaria,* and the causes of those diseases which for a long time have been called **zymotic**, now more often named **enthetic**—as small-pox, scarlet fever, yellow fever, cholera, etc.—about whose causative history something has been said in our section on **Etiology.** Each of these has more or less characteristic effects, to be described hereafter in their due place. That which is common to them all will be our now next following subject.

Fever.

When one has a hot, dry skin, a glowing red cheek, thirst, a rapid pulse, and weakness of body, with more or less dulness or disturbance of the mental faculties, we say he has **fever.** Constipation of the bowels, and scanty secretion from the kidneys, also commonly belong to the same condition. But of all this group of symptoms, the most constant one is **heat.** In health, a thermometer in the armpit will mark 98.5° Fahr. Fever often runs it up to 103°, 104°, 105°, or even higher still.

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* These *last* symptoms result from the non-removal of the *coloring-matter* of the bile, which may have been reabsorbed into the blood from the gall-bladder after being secreted by the liver, when the gall-duct is obstructed, as by gall-stones.

What causes this excess of heat? Several conjectures have been made about it; but not much has been proved. The most nearly certain explanation is, that it is owing to increased "combustion," that is, oxidation, going on in the blood. Always, oxygen is, during life, and still more rapidly after death, combining with and "consuming" the elements of the body, in the blood and in the tissues. This consumption or combustion, which produces animal heat, is *controlled* and *regulated*, during health, by the living energy (life-force) of the body; the nervous centres being the instruments of this regulation. But when a disturbing element is introduced, life-energy is lowered, and chemical changes go on more rapidly; hence a higher heat of blood-combustion.

Fever is met with in connection with many diseases. Inflammation of any of the great organs, brain, lungs, heart, pleura, bronchial tubes, stomach, bowels, etc., will, when active, be attended by it. And, without any inflammation, we meet with it in typhus; also with inflammatory affections *secondary* to the general disease, in scarlet fever, small-pox, measles, diphtheria; and with or without local inflammations, in yellow fever, in relapsing, intermittent, and remittent fevers; perhaps also sometimes without any true acute inflammation, in typhoid fever.

Two sorts of *origination* of the febrile state seem thus to exist: one, when it *follows* a local inflammation—**irritative** fever; the other, when it precedes inflammation or occurs without it, having its morbid cause in the blood—**toxæmic** fever. The various *examples* of it will receive our attention again after awhile.

CLASSIFICATION OF DISEASES.

Various plans of arrangement have been proposed, and are in use. I prefer to name all diseases as either **inflammations**, **toxæmic** disorders, **cachectic** affections, **nervous** disorders, or **unclassifiable** diseases.

Under the first head we place inflammatory attacks affecting the **brain** (meningitis *), **lungs** (pneumonia), **pleura** (pleurisy), **air-passages** (laryngitis, tracheitis, bronchitis), **heart** (endocarditis, pericarditis), **tonsils** (quinsy), **throat** (pharyngitis), **stomach** (gastritis), **bowels** (enteritis, colitis, dysentery), **peritoneum** (peritonitis), **liver** (hepatitis), **kidney** (nephritis), **bladder** (cystitis), etc.

As **toxæmic** disorders may be mentioned: 1. Those caused only by *contact* or *inoculation:* **primary syphilis, gonorrhœa, hydrophobia, vaccinia.**† 2. *Eruptive*‡ diseases, which are *contagious:* **small-pox, chicken-pox, scarlet fever, measles.** 3. Allied affections to the above, but *not eruptive,* although contagious: **mumps** and **whooping-cough.** 4. Diseases *generally epidemic or endemic:* § **typhoid fever, typhus, spotted** (cerebro-spinal) **fever, erysipelas, puerperal fever, influenza, diphtheria, plague,** and **cholera.** 5. *Endemic* and *occasionally* epidemic: **yellow fever, relapsing fever,** and **dengue.** 6. Endemic and "*malarious*"*:* **intermittent, remittent,** and **pernicious** (congestive) fever.

Of **cachectic** affections, a part of the long list will answer our purpose here. 1. Those which are always *chronic* (prolonged indefinitely, tedious, not tending to recover of themselves): **anæmia, chlorosis, leukæmia, general dropsy, tuberculosis, diabetes, constitutional syphilis.** 2. *Acute* or *subacute* (active, and of limited duration): **scurvy, gout, inflammatory rheumatism, pyæmia, septic fever** (septicæmia), etc. 3. *Local* cachexiæ (degenerations): as **cancer, goitre, Bright's disease** (of the kidneys), **fatty heart, gin liver,** etc. 4. **Skin-diseases**; which will be classified in another, more convenient, place in this book.

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* Nearly always this term applies; meaning inflammation of the *membranes* of the brain as well as of its substance.

† Glanders, sometimes taken from the horse, is another of this group.

‡ Physicians often call these *exanthemata.*

§ These words have been explained earlier in the book. *Endemic* is from *en,* in, and *demos,* a people, in the Greek; meaning among or in the midst of the people of a place. *Epidemic* comes from *epi,* upon, and *demos;* a disease which comes upon a people from somewhere else.

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Nervous disorders may also be only in part named here: **apoplexy, paralysis** (palsy), **epilepsy, catalepsy, hysteria, chorea** (St. Vitus's dance), **tetanus** (lock-jaw), **asthma, angina pectoris, locomotor ataxy** (one form of spine-disease), **convulsions, neuralgia, delirium tremens** (mania-a-potu), **insanity.**

Of **unclassifiable** diseases, not easily fitting in either of the above groups, there are **dyspepsia, cholera morbus, diarrhœa, colic, jaundice, hemorrhages, local dropsies, worms,** etc.

SIGNS AND SYMPTOMS OF DISEASES.

On approaching a sick person, our first question, whether put into words or not, is naturally, *Is there much the matter?*

Other inquiries follow, such as these: Has he *fever?* Is he very *weak?* Is his *head clear?* Does he suffer *pain* anywhere? What *organ* or *function* of his body is not as it ought to be?

So we proceed from one thing to another in forming what doctors call a **diagnosis** of a case. Experience makes such an examination more and more easy, rapid, and efficient. A besetting temptation, even with physicians, is, when enough has been found out to give a probable *name* for the malady of the patient, to conclude at once that this is the whole matter, and that we know *all about* his case. This cannot be true, however, unless we have carefully scrutinized *all* his organs, or at least have satisfied ourselves on good evidence as to the presence or absence of disorder in them all.

Our plan here makes suitable only a short account of the principal symptoms found in connection with different parts of the body, and their meaning; or, at least, the conditions with which they are most likely to be associated.

Symptoms Affecting the Skin.

The skin is **hot** and **dry in fever.**

Moisture is nearly always a favorable sign. Exceptions are, the *cold* and *clammy* perspiration of great prostration, and the *copious* sweating of *advanced consumption.*

Emaciation (wasting) is seen generally in those long sick. Sometimes it occurs rapidly, as in severe diarrhœa, or in the summer complaint of children.

The **color** of the skin may be changed considerably in disease. The face is—

Pale, during fainting, with sick stomach, and in anæmic persons.

Flushed, in fever, early stage of apoplexy, or intoxication.

Cheeks brightly flushed, in hectic fever of consumptives.

Purple or **livid,** in typhoid or typhus fever.

Yellow, in jaundice, bilious fever, and yellow fever.

Sallow, in chlorosis, dyspepsia, and cancer.

Blue, in the collapse of cholera, and cyanosis.

Black, almost, in suffocation from any cause.

Eruptions upon the skin belong to certain diseases, which will be described hereafter.

Symptoms Presented by the Mouth, etc.

The **tongue** is *pale,* in anæmic persons; *red,* in scarlet fever, inflamed mouth, and sometimes when the stomach is inflamed (*gastritis*); *furred,* in indigestion, and very often in fever; *brown,* or *black, cracked* and *fissured,* in *low* fevers, as typhoid or typhus. It is *pushed out with difficulty* in low fevers, and after an apoplectic attack; going *to one side,* in paralysis affecting one side only.

The **teeth** are covered with thick brown stuff called "sordes" in low febrile states. They are loosened, sometimes, by severe salivation, from large doses of mercury.

Doses of mercurial medicines large enough to produce such effects are not now given by regular physicians.

The **gums** are swollen, soft, and spongy, and disposed to bleed easily in *scurvy.* A *blue line* along the gums is observed in lead poisoning; a *red line,* occasionally, in advancing consumption. Swelling and soreness of the gums, with tenderness of the teeth and a "coppery" taste in the mouth, are signs of mercurial *salivation.*

Increase of saliva gives the name to this affection, once not uncommon in medical practice. *Iodide of potassium,* taken medicinally, will sometimes salivate. Large doses of *jaborandi,* or its active principle, *pilocarpin,* generally does so.

The **taste** is morbidly *bitter* in disorder of the liver; *sour,* often, in dyspepsia; *saltish,* with spitting of blood; *putrid,* in gangrene of the lungs.

The Throat.

Difficulty of **swallowing** may result from **inflammation** of the tonsils or gullet (*pharynx*); **spasmodic** closure of the throat; permanent narrowing or **stricture** of the pharynx or lower gullet (*œsophagus*); **obstruction,** as from a bone, etc.; **paralysis,** as after diphtheria, or extreme **weakness,** in the dying state.

Thirst is excessive in two opposite conditions: high **fever** and low **collapse.**

The Stomach.

Appetite is almost always *deficient* in both acute and chronic disease; most so, however, in the former, as a rule. *Perverted* appetite occurs in cases of *chlorosis*, and in some *hysterical* subjects.

Nausea (sick stomach), with or without **vomiting**, is met with in *indigestion, colic, seasickness, pregnancy* (morning sickness), *gastritis* (inflammation of the stomach), *hysteria* (occasionally), *cholera morbus, epidemic cholera, bilious remittent fever, yellow fever, ulcer of stomach, cancer of stomach, strangulated hernia* (rupture), *obstruction of the bowels, irritant poisoning.*

Symptoms Belonging to the Circulation.

Palpitation, or disturbed action of the **heart,** may depend upon *inflammation* of its *membranes* (*pericarditis, endocarditis*), *enlargement* (*hypertrophy* or *dilatation*), *valvular disease, anæmia,* with weakness, *nervous irritability* (nervousness), as from strong coffee, tobacco, etc., *dyspepsia, brain disorder.*

Fig. 176.

FEELING THE PULSE.

The **pulse** may be, in disease, *natural, strong, weak, firm, yielding, full, small, compressible, rapid, slow, quick, jerking, hard, soft, tense, gaseous, corded, wiry, thready, imperceptible, regular, irregular, intermittent, double* (dicrotous).

A **fever** pulse is moderately rapid, and in the early stages of an attack, strong; later, soft and compressible. When violent acute **inflammation** of any organ is present, it is quickened, *hard,* and rather full, as a rule.

A **nervously** disturbed pulse is quick (*jerking* rather than *rapid*), and *variable,* under excitement or repose.

In **extreme weakness,** most of all in the dying state, the pulse is

nearly always *rapid* and *small*, or "thready." A pulse of 150 or 160 in a minute, is almost always a sign of death. Very rarely is the pulse slow in the dying state.

Slowness of the pulse is most marked in *compression of the brain* (as in *apoplexy, fracture of the skull*, or *hydrocephalus, i. e.*, water on the brain), and in *opium poisoning*. Occasionally the pulse is very slow in cases of heart disorder.

Irregularity of the pulse is natural to a small number of persons, at least in childhood or in old age, without other signs of disease. It may be, otherwise, a transient symptom, particularly during convalescence from a fever. It is distinctly related to disease present, in certain cases of *heart disease* (when it is serious) and in the third stage of acute *meningitis* (inflammation of the brain). Excessive *smoking* of *tobacco* sometimes produces irregularity of the pulse, as was first shown by Dr. B. W. Richardson, of London.

A **double** (dicrotous) pulse is met with in many instances of *continued fever*, typhus or typhoid.

Slowness of the **capillary** circulation is occasionally shown, in morbid states, by the tardy return of the blood when displaced by pressure, as on the back of the hand or the cheek. In the **veins**, likewise, this is notably seen in the *collapse of cholera*.

Hemorrhage.

While bleeding from any part of the body is often an important symptom, it needs to be interpreted with care. Its consequence depends greatly on its **quantity** and the **source** from which the blood comes.

Thus, in bleeding at the **nose**, the flow of blood may possibly result from either of the following causes: a severe *blow; congestion* (fulness of blood) simply in the membranes of the nose; *congestion of the brain* (to which the bleeding may give advantageous relief); early stage of *typhoid fever; suppressed menstruation* (monthly discharge) of which it is an *alternative.*

Spitting of blood may come from hemorrhage of the *gums*, the back of the *nostrils, throat, windpipe* (bronchial tubes), *lungs*, or *stomach.*

If from the **stomach**, it is preceded by *nausea*, and is *vomited*. When from the **lungs** or bronchial tubes, it is *coughed up* instead.

Hemorrhage from the lungs (*hæmoptysis*) may depend upon *congestion* (over-fulness of blood) of the lungs; *heart-disease, tubercular consumption, suppressed menstruation*, of which it may, occasionally, be "vicarious," that is, an alternative or substitute; an *injury*, as a broken rib, wound of the lung, etc.; *rupture* of an *aneurism of the aorta*. (See the account of this affection later in the book.)

Vomiting of blood (*hæmatemesis*) may be one of the symptoms occurring in *hysterical* women; or it may result from *ulcer*, or *cancer* of the stomach; or it may be (as above) substitutive or vicarious of absent menstruation.

Uterine hemorrhage (other than the natural monthly flow) may come from *congestion* of the womb, or its *ulceration*, or *cancer*. During pregnancy it *threatens miscarriage*, or results from misplacement of the *placenta* (after-birth).

Hemorrhage from the **bowels** may be connected with *piles* (hemorrhoids), *dysentery*, *ulceration* of the bowels, *cancer*, *rupture* of an *abdominal aneurism*, *typhoid*, *malarial*, or *yellow* fever, or *vicarious menstruation*.

Hæmaturia (bloody urine) may follow a mechanical *injury*, *inflammation* of the *kidneys*, *stone* in the bladder, or a bad state of things in cases of *scarlet fever*.

Symptoms Connected with the Breathing Organs.

Sixteen to eighteen times in a minute is the ordinary rate of breathing while at rest, in health, for a grown person. In *fever* it is almost always a good deal *faster* than this; often thirty, forty, or more respirations in a minute. When a person is *poisoned with opium*, the breathing becomes *snoring*, and *very slow*, even only six times or less in a minute in heavy narcotism. *Apoplexy*, and pressure upon the brain from a piece of a *broken skull*, are also attended by *slow*, *snoring* respiration.

Difficulty of breathing (*dyspnœa*) may be caused by

Irrespirable gases (as chlorine, etc.) in the air;

Obstruction in the **air-tubes**, as from croup, asthma, or bronchitis;

Disease of the lungs or **pleura**, as in pneumonia, consumption, or pleurisy.

Disease of the heart or **aorta**;

Abdominal dropsy, pressing upwards.

Coughing, also, may have a variety of causes, of the nature of which we may often judge by its character. Thus it is, commonly,

Dry and **tight**, in *early bronchitis;*

Soft, deep, and **loose**, in *advanced* bronchitis;

Hacking, in the *beginning* of *consumption;*

Deep and **distressing**, in *advanced* consumption.

Short and **sharp**, in *pneumonia;*

Hoarse and **barking**, in an *early* stage of *croup;*

Whistling, in *advanced* membranous croup;

Paroxysmal (in spells) and **whooping**, in *whooping-cough.*

Dry and **hollow**, when *sympathetic* or *nervous*.

Expectoration is *white, thin,* and *mucous,* in catarrh and early bronchitis; *yellow* and *thick* (*purulent*) in *severe* and *protracted* bronchitis; *rusty,* in the middle stage of *pneumonia; bloody, thick,* and *yellow,* in developing *consumption* (phthisis); in heavy, round, small yellowish, *lumps,* in *advanced* consumption; *putrid* (rotten), in *gangrene of the lung.*

The **breath** is *hot,* during fever; *cold,* in the collapse of cholera. The **odor** of the breath is seldom perfectly agreeable except in a healthy child. Bad teeth and imperfect digestion are common causes of unpleasantness in it. It is *very heavy* at the *commencement* of a *fever; sour,* during an attack of *indigestion; rotten,* in gangrene of the lung.

Hiccough is produced by a *spasm* of the *diaphragm,* at the floor of the chest. It may depend upon *indigestion, nervous disorder,* or great *exhaustion.* In the last of these, it is generally a decidedly bad symptom.

Snoring (stertorous), respiration results (as above-mentioned) from *oppression of the brain;* the cause of which may be either *apoplexy, fracture of the skull, dead drunkenness,* or *narcotism by opium.* (Of course we do not forget that some persons snore tremendously during their natural and healthy sleep.)

Symptoms Affecting the Muscles.

Position is often significant in disease. **Inability to rise** may be owing to *general weakness, palsy, inflammation of the joints,* etc. (as from *rheumatism* or *gout*), or an *injury,* such as a broken thigh or leg.

Inability to lie down is generally the result of *difficulty of breathing* (dyspnœa), which doctors then call *orthopnœa,* or *straight-up* breathing.

In **colic,** the patient usually prefers to lie *upon the belly.*

In **peritonitis,** the chosen position is *on the back,* with the *knees drawn up.*

In the *early stage* of **pleurisy,** the patient lies of choice on the *side not affected;* after *water collects* (effusion) this is reversed. When the liver is *enlarged* from disease, the *right* side is mostly preferred. When the **heart** is much disturbed in its action, the sufferer generally *cannot* lie on the *left* side. Exceptions occur in heart disease, especially of long duration.

In **aneurism** of the **aorta,** a favorite position often is sitting up and *leaning over* the back of a chair, or the edge of a bed.

Muscular weakness may result from acute *disease,* as fever, or from *exhaustion.* Entire *want of exercise* weakens the muscles. When an arm or a leg has been long fastened up in splints on account of a fracture, its muscles are almost powerless upon first being taken out of their confinement.

Spasm may be of either of three kinds: *fixed*, or *tonic* spasm, as in *lock-jaw* (tetanus); *regularly jerking*, or *clonic*, as in fits or *convulsions;* and *irregularly* jerking, as in St. Vitus' dance or *chorea*. *Cramp* is a short-timed *tonic* spasm.

Tremor (trembling) is of two kinds: *constant* trembling, as in *shaking palsy* (*paralysis agitans*), and tremor *only when doing something*, as in one form of disease of the brain and spinal marrow.

Rigidity of muscles is different from mere spasmodic contraction. It occurs in certain severe and continued cases of *palsy* (paralysis).

Jerking of the **tendons** (*subsultus tendinum*), especially at the wrists, is met with in *low states* of continued *fever*, typhoid or typhus.

Symptoms Connected with our Senses.

Pain is variously interpreted, according to its *place* and character. It may be

Acute, sharp, cutting, as in pleurisy;
Shooting, darting, as in neuralgia;
Piercing (lancinating), in cancer;
Gnawing, tearing, in rheumatism;
Dull, heavy, aching, as in pneumonia;
Griping, twisting, in dysentery;
Bearing down, in second stage of labor;
Pulsating, in the formation of an abscess;
Burning, smarting, in erysipelas;
Stinging, nettling, in urticaria (nettle-rash);
Constant, or **intermittent**; fixed or wandering.

Tenderness on *pressure* is generally a sign of *inflammation*, although some *neuralgic* cases have it; possibly from inflammation of the sheaths of the nerves. *Tired muscles* also are often sore to the touch as well as on motion.

Sometimes pain is *relieved* by pressure; this is often the case with *colic*. In such instances we conclude that there is *no inflammation*.

Pain is *not always at the place of disease*. In disease of the *hip-joint*, the principal pain is at the *knee;* in *dyspepsia*, often, over the *middle of the breast;* when the *liver* is disordered, under the *right shoulder-blade;* in irritation of the *womb*, at the *top of the head*.

Loss of sensation (anæsthesia), occurring from disease, constitutes one kind of *paralysis*. The other form is *loss of power* to move the limbs or parts affected. When paralysis involves *one side* of the body only, as the right arm and leg, or the left arm and leg, we call it *hemiplegia*. *Paraplegia* is palsy of *both* legs at the same time. (See p. 517.)

THE EYE IN DISEASE.

Blood-shot eyes show either inflammation of them or *fulness of blood in the head,* which is often present in *fevers.* If one eye only is very red, of course the trouble must be in itself. **Yellowness** of the "whites" of the eyes occurs in bilious disorder.

The eyeballs are notably **prominent** in that curious and rather uncommon disorder called "exophthalmic goitre" (of which mention will be made again hereafter). *Prominence* or bulging of *one eye only* shows a probability of disease, as a tumor, *behind* that eye.

Sinking of the eyeballs in their sockets is seen to some extent in consumption and other *wasting* diseases. Sinking of *one* eye must result from wasting of its own substance or of the socket behind it, the former being often observed in the blind.

Rolling of the eyes from side to side is common in great *nervous restlessness* of infants or young children.

Squinting (*strabismus*), which is natural with some, and an acquired habit with others, becomes a serious symptom when it occurs as the result of *disease of the brain.*

The **lustre** of the eyes grows dull often a short time, perhaps a few hours, before death. *Bright* eyes are commonly noticed in advancing consumption. They may *glare* in *mania* (insanity), or, for a time, in acute *inflammation of the brain.*

Very small **pupils** of the eyes are seen when either *they* are, or the *brain* is, the seat of inflammation. In *opium-poisoning* the pupils are contracted, at least until very near death. They are *large* (dilated), commonly, in *apoplexy, water on the brain* (hydrocephalus), and poisoning by *prussic acid* or by *Jamestown weed* (stramonium) or *belladonna.*

Great **shrinking from light** (*photophobia*) exists in severe inflammation of the eyes, and also in acute inflammation of the *brain.*

Spots, *rings,* etc., floating before the sight (*musca volitantes*) show the presence of opaque particles in the interior of the eyeball (*vitreous humor*), which are not of much importance. *Fixed* dark spots are of more consequence; they often show a beginning of blindness.

THE EARS.

Pain in one of the ears, earache, may be either *inflammatory* or *neuralgic.* Other signs must be considered along with it to show which it is.

Ringing in the ears (*tinnitus aurium*) occurs from either of at least two or three causes, to distinguish between which is not always easy. *Large doses of quinine,* and of one or two other powerful medicines,

will make many people's ears ring or roar. Disease of the *ear* will often produce this symptom, even when the disease is not severe at the time. In other instances, *brain exhaustion*, or *congestion* (overfulness of blood) of the brain, may give rise to it. If it be heard only in *one* ear, we may be confident that the cause is *in* that ear itself.

Deafness, or hardness of hearing, in various degrees, may proceed from

Cold in the head;

Very large doses of **quinine**;

Typhus or **typhoid fever**;

Wax accumulated in the ears;

Disease or **injury** of the ears;

Brain disease.

Headache.

Pain in the **head** may depend in different cases upon

Neuralgia;

Rheumatism;

Overfulness of blood (*congestion, hyperæmia*);

Blood poisoning (as by alcohol, opium, etc.);

Fever (remittent, typhoid, etc.);

Disease of the brain;

Sympathetic irritation (as with uterine disorder, etc.).

Skill as well as care may often be necessary to make out, in an actual case, to which of these a headache (*cephalalgia*) belongs. *Neuralgic* headache is nearly always on *one side* only or chiefly, and extends to the *face* also; it is shooting or darting, and there is with it some *tenderness on pressure*. *Rheumatism* of the scalp is usually accompanied by stiffness of the *muscles* that move the head and neck. Headache from *fulness of blood* or *fever* is attended by *heat* of the head; the pain is then apt to be *throbbing* in character. Pain from *disease of the brain* is generally *in one spot*, either *fixed* or in *spells* (periodic or paroxysmal); and some other sign of brain disease is also present with it. (See p. 519.)

Expression of the Face.

Acute disease is apt to alter this more than that which is **chronic**; but it is often changed in both. An anxious or distressed expression giving way to serenity is always a good sign, *unless* it be the result of *mortification* or *palsy* coming on.

Great anxiety is seen especially in organic diseases of the **heart**, and in acute disorders of the **abdomen**, as well as in **melancholy**.

Terror belongs habitually to **delirium tremens**, also called *mania-a-potu*, or the *horrors*.

Rage is now and then seen in insanity (**acute mania**), and in some, not all, cases of **hydrophobia**.

Insane persons, although *not always* very peculiar in countenance, have mostly an expression by which their derangement can be recognized by those accustomed to observing it.

Collapse, that is, extreme prostration, as from the shock of a railroad accident, an attack of cholera, or the dying state from any cause, has its own characteristic expression, more easily understood when seen than described. Shrunken cheeks, pale or livid, with mouth drawn down at the corners, and white, glassy eyes; these with clammy coldness to the touch, gasping respiration, and a thready or absent pulse at the wrist, mark this condition.

Delirium.

This is a disorder or confusion of mind, in acute disease, not fixed for a long time like insanity, but depending upon a temporary cause. It is present in many attacks of maladies attended by **fever**; as severe remittent, typhus, typhoid, scarlet, or yellow fever, etc. A few persons are liable to transient delirium during almost any brief attack of illness. *Mania-a-potu*, as already said, has a characteristic delirium, in which, almost always, there is extreme terror, from imaginary enemies or dangers of some kind.

Doctors speak of *active* delirium, in which the patient talks a good deal, and tries to go about; and *passive* or *low, muttering* delirium, when he lies still and only mumbles incoherent words.

Grown people are affected by delirium usually under circumstances which, in a child, would bring on *convulsions*.

Stupor.

Coma is the medical word for this. It is an unnaturally deep sleep, from which one cannot be roused. We meet with it chiefly in the following: alcoholic **drunkenness** ("dead drunk"); **opium poisoning** (narcotism); **apoplexy**; very low **typhus fever**; compression of the brain from **fractured skull**.

It is not always easy to say, in a particular case, which of these is present.

Intoxication is generally shown by the odor of the *breath*, and the general appearance of the patient, and his behavior before he became unconscious. In *opium poisoning*, the *pupils of the eyes* are, as a rule, strongly *contracted*, even when no considerable light is shining on them. *Typhus fever* is known by the history of the case; as, in it, complete stupor is never the condition at the very *beginning* of the illness. A *broken skull*, if not obviously accounted for by a known injury, may be

found out by careful examination of the head. (Of this again hereafter.)

Dizziness (giddiness, vertigo) is accounted for in different instances by either of four causes: mere *weakness;* disorder of the *liver* (biliousness, *cholœmia*) and *stomach;* disease of the *internal ear;* disease of the *brain.* The last of these is the least common, unless in persons over sixty years of age.

Loss of speech (*aphasia*), or getting the wrong words instead of those intended, comes from a disorder of the brain. It is often accompanied by *loss of power*, especially in the right arm and leg. Loss of *voice* (*aphonia*) is another thing; resulting from thickening of the lining membrane of the windpipe (*larynx*), or paralysis of its muscles; or, in the dying or nearly dying state, extreme debility.

Symptoms Affecting the Secretions: The Bowels.

Constipation (tightness of the bowels; absence or rarity of movement, and smallness of amount discharged) is almost always present during the first days of a *fever*, of any kind except *typhoid.* Even in that, also, although early looseness of the bowels is more common, there is in a few cases a short time of constipation.

Pregnant women are very apt to have the bowels constipated, from the partial obstruction produced by the pressure of the enlarging uterus upon the lower bowel (*rectum*). Sea-sickness, also, is very often attended by slowness of the bowels. But the most obstinate and alarming constipation is that of *obstruction* of the bowels; as in *strangulated rupture*, or in *intussusception* (both to be again mentioned in another place).

Diarrhœa (excessive liquid flow from the bowels) is symptomatic of various disordered conditions. It is present as a rule in *typhoid fever*, and is common in advanced pulmonary *consumption.* It is an essential part of the attack in *cholera morbus*, *epidemic cholera*, and *cholera infantum* (summer complaint of infants). It occurs frequently by itself, particularly in warm climates, and in the summer season.

Discharges in diarrhœa are either *natural* (fecal), *mucous* (slimy), *bilious*, or *watery.* In *cholera morbus*, which may be met with anywhere, the passages are nearly natural or bilious, unless near the end of a very bad case. *Epidemic cholera* is distinguishable partly by the *rice-water-like* abundant discharges, with no biliary color at all.

Dysentery is recognized by scanty but frequent *bloody* discharges, with *griping pains*, and a disposition to *bear down.* Slime (*mucus*) is apt to be mingled with blood, also, and at a later period in severe cases there may be pus.

Excretion of the Kidneys.

Symptoms connected with this excretion are: **strangury** (difficult urination), **incontinence** of urine (want of control, especially during sleep), **retention**, **suppression**, and **excess** of the secretion (*diabetes*), and **unhealthy character** of the urine passed.

Strangury sometimes follows the application of a fly (cantharides) blister. Now and then it is observed in children from the irritation of seat-worms in the lower bowel; and in young infants, owing to an irritating quality of the urine; which, in such a case, is pretty sure to be *scanty* and *high colored.*

Nightly incontinence of urine is quite common in children, sometimes up to their "teens." Dribbling while *awake* shows a much greater loss of power over the bladder. This is seen in many cases of injury or serious disease of the *spinal marrow.*

Retention of urine may be a very distressing symptom. Men suffer it who have "stricture" of the *urethra* (outlet tube from the bladder). *Nervous disturbance* may cause it in either sex, but especially often in hysterical women. *After child-birth* it follows pressure upon the neck of the bladder. In *low fevers,* as typhus or typhoid, it results from general debility. Its probability should always be *remembered* in such cases, as the patient may be "out of his mind" and so may give no account of it. We should make sure, in a fever case (or, indeed, in any other illness), *how much* and *how often* water is passed. If the quantity is certainly small, it is necessary to examine the abdomen at its lower part, over the bladder. When urine is *retained,* there will be a firm swelling at the lowest part of the belly, just in front, above the bony ridge of the pelvis; and, on tapping there with a finger, a *dull* sound will be made. If the bladder be empty, the sound will be rather hollow.

In some cases of *spine disease,* there is retention instead of incontinence of urine. This symptom, however produced, often calls for relief by the use of a tube introduced through the urethra into the bladder, called a *catheter.* It is short and almost straight for the female; longer and curved (if of metal or firm rubber) for the male subject.

Suppression of urine is always a *bad sign,* in any case of disease. It is sometimes met with in low fevers, epidemic cholera, bad cases of scarlet fever, and long standing cases of disease of the kidneys. *Uræmia* (blood poisoning with materials of urine) follows it, and usually ends life in a few days at most.

Excess of urinary discharge is called by physicians *diabetes.* It occurs not unfrequently, for a time, after checking of perspiration by exposure to cold. Hysterical or other nervous persons also may be affected with it. Common report says that soldiers almost always have

need to empty the bladder just before going into a battle. The chronic (prolonged) *disease* called *diabetes* is attended by a remarkable change in the character of the urine passed; which is very *heavy* and contains *sugar*.

Qualities of the Urine.

About forty, or from thirty to fifty, fluid ounces (a quart, more or less) of urine is passed by a healthy grown person every twenty-four hours. It may be retained longer in the female than in the male bladder, but not many hours commonly in either. More is passed, and more frequently, during *winter* than in summer. *Warm* temperature promotes *perspiration, cold, urination.*

The color of healthy urine is that of amber. It should be clear when passed, and should have very little settling at the bottom, even after standing for some hours. Yet some change in color, lighter or darker, or variations in quantity, and even deposit of sediment, may take place while the person continues in health. Such alterations often show the successful *relief* of the system, by excretion, of what, if *not* carried off, might have caused disease. *Great* and *continued* alterations in the urine, however, are important signs of *something being wrong;* and, under skilful examination, the *nature* of the disease may thus be found out. For this kind of inquiry the skill of the physician, trained in the use of *chemical tests* and the *microscope,* will be required. Our present plan calls only for an account of what any observant person may discover and understand.*

We judge of the character of the urinary secretions by noticing, besides its quantity, its general **appearance, weight** (specific gravity), reaction with chemical **tests,** and the presence or absence of different kinds of **sediments.**

In *appearance,* it may be *clear* or *opaque, light*-colored or *dark.* If *clear* and *deep-colored,* we infer a too rapid *wasting of substance* to be going on in the body at the time. In *jaundice,* the urine is generally very *yellow,* and sometimes is as *dark* as *porter.*

When *opaque,* it is either *white* or *dark. White* opaque urine contains either *mucus* or *pus,* or undissolved earthy sediment, or all of these together. *Mucus* floats more as a cloud than *pus;* the latter is apt to be opaque throughout, though with a more creamy layer at the bottom. Pus, however, can be readily diffused (more so than mucus) by shaking. (Mucus always shows a *less violent,* or *less advanced,* inflammation than pus.)

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* See the author's "Essentials of Practical Medicine," under *Semeiology,* for further particulars on this subject.

Dark-colored opaque urine is most frequently tinged with blood, giving it a pinkish or brownish hue. Blood may be in the urine either from the *kidneys* or from the *bladder;* or, after an instrument has been used, from the *urethra. Bile* also may give a dark color to the urine, as in non-secretion of bile by the liver (or its reabsorption) in *jaundice.*

The *weight* (specific gravity) of the urine may be easily determined by using a *urinometer* (hydrometer), which is a little glass upright, with mercury at its lower end, and a marked scale above. In *healthy* urine (as in *pure water* the 1000 mark is just at the *water-level*) it should only sink so far that the 1017, or from that to the 1020, line just touches the level. In *diabetes mellitus* (with sugar in the urine) it may rise to 1060 or 1070. In the clear and abundant urine of some hysterical persons it may be so *light* as to mark 1010 or less.

FIG. 177.

URINOMETER.

Tests require for their use, as already said, chemical skill. It is easy for any one, however, to find whether the urine is *acid* or *alkaline.* In health, and mostly also in disease, it is *acid,* more or less. This is shown by its *reddening* a strip of *litmus* paper dipped into it. If, instead, it be *alkaline,* it will *restore* the blue color to litmus paper which has been reddened by another acid (as vinegar), and will change the *yellow* of *turmeric brown. Alkaline* urine is noticed particularly when *mucus* remains for some time in the *bladder.*

Physicians use tests especially to find out whether, in cases of disease, the urine contains *albumen* (as in Bright's disease) or *sugar* (as in *diabetes mellitus*). For these processes we must refer to medical or chemical works.* In those also are described the various minute forms of crystals, corpuscles, etc., observed in the fresh or dried sediments of urine, by aid of the *microscope.*

Gravel is the term applied to small stony particles which are formed in the kidneys from disease, and pass, first along the *ureters* to the bladder, and thence out through the *urethra* with the flow of urine. *Pain,* sometimes very severe, may attend both of these short journeys of particles, if they be *large.* Often, however, they are more like *sand* than gravel, and escape without giving pain, except that both the kidneys and bladder are apt to be in a state of irritation at the time of an "attack of gravel."

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* It may be merely mentioned that *nitric acid* followed by *heat* will cause a milky appearance in *albuminous* urine. *Both* are needed to make the test sure. One test for *sugar* in urine is, to add a little strong solution of *sulphate of copper* to a portion of it, and then pour in half its bulk of *solution of potassa.* On heating the mixture, a yellowish or reddish-brown precipitate settles to the bottom of the vessel. Glass test-tubes should be used for such purposes, with a spirit-lamp.

Stone in the bladder is of the same nature, only the particles accumulate into one or more masses, which may become very large, and cause great suffering; not seldom, unless removed by an operation, shortening life.

Gall-stones are formed by thickening of *bile* in the *gall bladder*, which lies under the liver, on the right side, near the middle of the body. Although the gall-duct, through which such stones pass to the small intestine, is short, a large gall-stone (biliary calculus) sometimes gives *extreme pain* in its passage. Complete relief comes when it enters the small intestine (duodenum); as is the case likewise when a *gravel-stone* escapes from the ureter into the bladder.

Perspiration.

Besides *deficiency* and *excess* in this important secretion of the skin, it is a familiar fact that it has, in some persons, a very unpleasant *odor*, especially in the armpits and about the feet. Perhaps this is somewhat most manifest in the African and other tropical races, but much depends on individual constitution and cleanliness. A few persons, with all possible care of their skins, still have a considerable odor, at least in warm weather. For such it is important to bathe frequently, applying good soap and water daily to their armpits and feet; and also to keep their *bowels* regularly and sufficiently open. The odor seems to be due in part to an unhealthy misplaced (vicarious) excretion by some of the glands of the skin.

In small-pox, typhus fever, and some other diseases, an odor peculiar to each is given off (in some cases at least) from the body.

Menstruation.

This is not truly a secretion, it is rather a periodical and natural *hemorrhage;* although of somewhat altered blood. Its deviations from health, besides mere irregularity, are **amenorrhœa**, **menorrhagia**, and **dysmenorrhœa**.

Amenorrhœa is *absence* of monthly discharge. **Menorrhagia** is *excessive* flow at such times. **Dysmenorrhœa** is the term applied when it is attended by *pain*. We must leave for another place further consideration of these affections.

Physical Diagnosis.

By this is meant the *close* examination made by physicians into the state of the organs in the chest and abdomen, by measuring, feeling, tapping, and listening (*mensuration*, *palpation*, *percussion*, and *auscultation*). **Percussion** is tapping with a finger end, or a small hammer,

so as to compare the sound brought out with that of a healthy chest or abdomen. **Auscultation** is listening, either directly or through a tube (stethoscope), to ascertain the *breathing* sounds, or those belonging to the *heart* in its rhythmic action. An attempt to discuss at length this subject, which can only be practically understood with the aid of considerable experience, would be out of place in a work on **Domestic** Medicine.

Temperature in Disease. Thermometers are made for ascertaining this (clinical thermometers). The bulb is commonly placed in the *arm-pit* (sometimes under the tongue, or in the bowel, by direction of the physician), where it should remain about five minutes, to get the temperature of the body. During health this will be, in an adult, 98.5° (from 98.4° to 98.6°); in a child, 99° or 99.5°, possibly 100°. In tropical climates, it is sometimes a degree higher than in temperate regions. In the latter, it is apt to be highest on waking in the early morning; lowest at midnight. In tropical regions, it is lowest in the early morning, and highest shortly after noon. During fever, however, it is always highest a few hours before midnight.

A rise of temperature, in disease, of 1° Fahrenheit, corresponds, as a rule, with an increase of the rate of the pulse of from eight to ten beats in the minute. The thermometer has been known, especially in scarlet fever, yellow fever, and tetanus (lock-jaw), to mark as high as 108°, 110°, or even 112°. An authority on the subject (Aitken) says: "When the temperature is increased beyond 98.5°, it merely shows that the individual is ill; when it is raised as high as 101°—106°, the fever is severe; if above 105°, the patient is in imminent danger; with 108° or 109° a fatal issue may without doubt be expected in a comparatively short time."

Convalescence from disease does not begin until the natural temperature of the body returns, and is maintained unchanged through the day and night.

33

PART II.

REMEDIES.

REMEDIES.

DO doctors, properly speaking, *cure* the diseases and injuries of their patients? Yes, and no. *Cure* comes from a Latin word meaning *care;* to *take care* of something or somebody. That a good physician will always do. Sometimes, also, he may and must actually *interfere* with what is going on; as when he gives an antidote for a poison, and so saves life that would otherwise be lost. But, in many other instances, he simply *takes care* of the patient, and Nature *cures,* in the full sense of that word. There is, as we are created, a *tendency to get well,* which was called by the ancients *vis medicatrix naturæ.* A bone, for example, is broken. What does the surgeon do? He draws it out straight, gets the pieces into their proper line, and puts on splints to *keep them there.* Then the bone knits, in a few weeks, *of itself.* So also with the healing of a wound. Its edges are placed and kept close together, if that can be done, till they unite again; or, if that be not possible, the wounded surface is covered with something which can do no harm, and which *protects* the part from outside air and other things, until it *heals,* of itself.

Here we see that certain **conditions** are wanted in each case, in order that the knitting or healing will take place. So it is with *diseases,* as well as with injuries. Some disorders are naturally **self-limited**; that is, they will, if the patient lives for a certain time, get well of themselves; they run a tolerably regular course, and then end. Scarlet fever either kills or is passing off, generally, within eight, nine, or ten days; small-pox runs its course, living or dying, within about three weeks; typhus fever, in four weeks; typhoid fever, in the same or a longer time; and so with other **fevers,** all of which are self-limited.

What the doctor has to do in such cases may be shown by an illustration.

He is like the captain or pilot of a ship. The wind, or steam, *drives it on;* he simply directs its course; *steers it,* away from dangers, and towards its intended haven.

As, however, sometimes, the captain of a vessel has more to do than only to steer it—in time of great danger, for example, to *take in sail, cut down a mast,* or throw overboard his cargo—so there *are* cases of *disease* in which the physician must actively *interfere;* and cases of *injury,* in which the surgeon must *operate.* These cases are fewer than those in which "steering" only is called for; but they are *very important;* and only a skilful physician or surgeon can with confidence ascertain when and how they are to be dealt with.

Hence **there will always be need of doctors,** and of skilful, well-trained, and well-informed ones, too, however highly we may appreciate the powers of nature and the value of good nursing. Those who understand these best will be the most able to do justice to the real worth of a judicious medical or surgical practitioner. The purpose of this part of our book, on **Home Medicine,** is not to attempt to show how doctors can be dispensed with, but to enable those who, under circumstances not very rare, cannot at once have competent medical advice, to judge what is the *best thing to do* while *waiting for it.* Also, it is hoped that the knowledge thus set forth may enable our readers to *understand better,* and thus place more *intelligent confidence* in, what doctors advise in cases that are brought under their care. The times of superstitious expectation of *magical* doings on the part of the physician (like those of the Indians' "medicine-men") have well gone by. Every one knows that no skill will always avert death. But it is important to be sure, also, that by the timely and well-judged use even of simple measures, death may often be averted or long postponed; suffering may be much lessened, and recovery may be hastened from diseases which otherwise would be of very uncertain and far-off result.

Looking at remedies from our present standpoint, we may classify their *objects* as follows.* Whatever their nature, they are used for one or more of the following purposes:

To relieve pain;

To compose nervous disturbance;

To promote sleep;

To open the bowels;

To check diarrhœa;

To relieve vomiting or sickness of stomach;

* This classification is also used, with some slight differences, in my little book entitled "The Family Adviser and Guide to the Medicine Chest;" Philadelphia, J. B. Lippincott & Co.

To allay indigestion;
To improve weak digestion;
To reduce inflammation;
To lower fever;
To ease or quiet cough;
To stop hemorrhage;
To regulate menstruation;
To relieve dropsical swelling;
To support the system under prostration or exhaustion;
To increase strength in prolonged debility;
To cure certain diseases by special remedies;
To expel worms;
To antidote poisons;
To obviate the danger and suffering of accidents or injuries.

A full consideration of all the articles and procedures that are or may be used under advice of physicians for these different purposes, would make a work on "Materia Medica and Therapeutics." Many such technical and professional works have been written.* Our present aim will be to give a simple general view of the subject, and to dwell on such remedies as are safe and available in **Home Medicine**, when no physician is to be had; only briefly mentioning, also, some of those which are less suitable for domestic employment, although used in medical practice.

* The most satisfactory information of this sort may be obtained by reference to the "United States Dispensatory," by Wood and Bache and their successors, or the "National Dispensatory," by Stillé and Maish.

To Relieve Pain.

Much depends on *where* the pain is, and of *what sort.* **Anodynes** are medicines whose action is to quell pain, by their influence upon the brain or nerves. But we do not nearly always have to resort to these on account of pain, especially when it *first begins* to be felt.

Of all parts of the body, probably the **abdomen** is the most frequent seat of pain. "Stomachache" and "colic" are very common. The most general cause of such attacks is *indigestion* with *flatulence* (wind in the stomach and bowels). To make the *muscular coat* of the stomach and intestines *contract* actively and *evenly*, all along their length, will, at least if done *early*, be pretty sure to give relief. For this purpose we give warm and gentle *stimulants* to the stomach, as Essence of Peppermint, Essence of Ginger, or some other **aromatic** (spicy) medicine.

But a frequent cause of irritative pain in the stomach or bowels is the presence of *acid* from indigestion. Against this we have what are called **antacids**, because they *neutralize* acids by combining with them. Such are *lime-water*, *soda*, and *magnesia.* Often there is great advantage, in cases of colicky pain, in adding one of these to an aromatic.*

Further, the bowels are often *constipated* under the same circumstances, and this makes matters worse. It is of much importance then to *move the bowels*, by **purgatives**, or, as the milder ones are called, **laxatives.** *Magnesia* is one of these, being also, as above said, an antacid, thus having a double advantage. *Rhubarb* is another; it is combined with aromatics in *Spiced Syrup of Rhubarb*, an excellent preparation, especially for children, and as a *mixing liquid* or "vehicle" for other stronger and more unpleasant medicines. Another, often good in colic, though nasty, is *castor-oil.*

A safe and often very useful remedy for pain in the abdomen, or, indeed, anywhere else, is the outward application of a **mustard plaster.** When doubtful what else to do, try that. Properly used, it can do no harm, and it will most probably do good, often a great deal of good. [How to make and use a mustard plaster will be explained later in this book.] A *right hot piece of flannel* laid over the belly will sometimes be almost as useful as a mustard plaster.

Colicky pain may be lessened (in my own person it is *entirely relieved*) by firm *pressure* on both *hip bones*, near their front edge. This can be done with one's own thumbs and fingers, or by those of another. The

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* An old name for aromatic medicines given for flatulence is "*carminatives.*" Some *particulars* about the medicines now and shortly to be mentioned, will be given hereafter.

pressure should be pretty hard, though steady and not enough to hurt of itself.

Gentle pressure, and still better *kneading* the bowels, at the seat of pain from flatulence, will often help to scatter the wind and promote its moving and passing downwards, which is very important in colic.

Also, *rubbing* over the stomach and back with a *hair-brush* or clothes-brush, as briskly as can be comfortably borne, will sometimes do a wonderful amount of good for colicky pains.

If such **palliative** means as those just spoken of, as *aromatics, laxatives,* and *outward warming applications,* do not, in a reasonable time, show signs of affording relief of severe pain—we may have to obtain medical advice, or in its absence to resort to **anodynes**. Of these, the quickest and most effectual are those made from *Opium,* especially *Laudanum* (tincture of opium). A much weaker one is *Paregoric* (camphorated tincture of opium). *Camphor* is, in the form of Spirits of Camphor, both an *aromatic* and an *anodyne;* in the latter quality, however, less potent, at least in ordinary doses, than opium. Both, and especially opium, require great *care* in their use. [Doses will be mentioned particularly hereafter.]

Pain in the abdomen, however, results by no means always from indigestion or colic. It may possibly be the beginning of *inflammation of the bowels,* or of *dysentery;* or of *peritonitis;* or of *obstruction* of the bowels; or it may be seated in the *liver;* or in the *kidneys* (then rather in the *back*); or, if low down, in the *bladder;* or, in the female, in the *ovaries* or *womb;* or there may be an *aneurism of the aorta,* or a *cancer;* or it may be only a form of *neuralgia.* For each of these, which a good deal of knowledge may be needed to ascertain, a different kind of treatment will be called for; the pain being only one of the manifestations of disorder. Therefore any suspicion of so serious a possibility as either of these (or even *severe* or *obstinate colic*) will be a proper reason for promptly obtaining the advice of a physician.

For the relief of pain in the **side** or **chest**, a mustard-plaster is to be considered, after trial of *rubbing,* and simple *heat* (by a hot flannel, hot flat-iron, bag of hot salt or sand, or a tin vessel filled with hot water) the first active remedy. So much here depends on the **origin** of the pain, that no further uniform treatment of chest or side pains can be advantageously laid down. Pain in the chest may result from *pleurisy, pneumonia, neuralgia, rheumatism, heart-disease, aneurism of the aorta,* etc., or from so secondary a cause as *dyspepsia* ("heartburn," cardialgia). Each of these requires some difference of management.

Physicians often use, for the relief of severe or obstinate pain, *Morphia;* which is got from opium. With them, a favorite way of employing this is by introducing a solution of it *under the skin,* by what is called "hypodermic injection." A small and finely pointed syringe is the instrument for this purpose; but it is hardly adapted for *domestic* practice. A full account of it is given in medical works.*

Pain in the **head** has been, on a previous page, said to be of several kinds, and dependent on several causes. Very seldom are *anodynes* suitable as remedies for headache, because they all act more or less powerfully on the *brain,* and so, if they do not do good, they may do real harm. As a rule, we may say, *never* take opiates or other anodynes for *headache,* unless directly under *medical advice.* For "*sick headache,*" which is habitual with certain persons, and then very hard to cure or even relieve, the most *frequently* useful remedy is a dose of *magnesia* and *aromatic spirit of ammonia* (doses and other particulars hereafter). When an aching head is *hot,* we are safe always in trying to *cool it,* by laying upon the forehead a light handkerchief wet every few minutes with *cold water.* A *neuralgic* headache will be more likely to be helped by application of *heat* to the part affected. Gentle rubbing with a pencil of *menthol,* such as is now sold by druggists, will often mitigate, if not relieve, it.

Pain in the **face** is likely to be of one of three kinds: *toothache* in a *decayed* tooth (or more than one); *inflammation* of the jaw; or *neuralgia* ("tic douloureux"). For the *first,* the most certain remedy is, to apply to the hollow of the aching tooth the end of a bodkin or darning-needle, around which is wrapped a little bit of cotton dipped in pure *Creasote.* As this will burn the lips or gums if it touches them, care should be taken to have it overflow as little as possible; and a glass of cold water must be at hand to rinse the drop or two away, if such does escape into the mouth. If the creasote reaches the *right spot,* it will quell the pain at once. *Oil of cloves,* used in the same way, is nearly as effectual; and rather less so is laudanum.

For *inflammation of the jaw,* advice had better be taken at once from a dentist or a physician. A hot *poultice* of Flaxseed-meal, into which has been poured a teaspoonful of laudanum, may be safely applied to the painful side of the face, and covered with oiled silk (or oiled paper, or thin sheet-rubber) to prevent it from drying up and getting cold too soon. *Neuralgia* may be best considered in another place, hereafter.

* See "Essentials of Practical Medicine," before referred to, on this and kindred subjects.

Earache is most common in young children. A simple *first* remedy for it is a drop of *warm sweet oil* poured from a bottle or a teaspoon into the ear. If that fail to relieve, a drop (or in a child two or three years old, two drops) of *Laudanum* may follow it.

Pain in the **joints** is usually called *rheumatic;* although this word is not always definitely used. When there is no *swelling,* or *heat* (signs of inflammation), *warm applications* are likely to do good. For the pain of the joints in *inflammatory rheumatism,* the most relieving thing is *Laudanum;* laying on the joint a bit of rag, doubled and wet with laudanum, and binding over it a piece of oiled silk. It will not do to put laudanum in this way over *too many* parts at once; as some of it is absorbed, a large amount of it might *narcotize* the patient.

Neuralgic pain in any part of the body is generally but one symptom of a *general condition,* depending on a *predisposition* of the *nervous system* and (in most, not all cases) *poverty of the blood.*

The former, being constitutional, is to be attended to by all the ways we have of favoring the general improvement of health and strength. Poverty of blood is treated also by good nourishing food and *Iron.* For the immediate *relief* of *attacks* of neuralgia, many things are helpful, while nothing is certain in every case; except that, if *driven* to it by great suffering or exhaustion from pain, anodynes (as opium, or morphia, or some of their preparations) will stupefy sufficiently to "drown" the agony.

Temporary weakness often brings on attacks of neuralgic pain in those disposed to have them. Such persons should *never wait too long for a meal.* Likewise, *hot food,* as a cup of *hot milk,* or *cocoa,* or *beef-tea,* at the very beginning of the attack, may stop its progress.

Heat applied to the painful *part* will frequently do good; any convenient mode of application will answer. On some parts of the body a *mustard-plaster* is just the thing. *Sunshine* will (as I have seen) cure some attacks. On the other hand, I have read of *ice* applications having the same effect; but I have never witnessed its trial. The Japanese remedy, *menthol,* or *oil of peppermint,* is conveniently applicable in the form of rounded sticks, made by the druggists by mixing it with spermaceti. One of these may be gently rubbed over the painful part for a few moments at a time.

Various powerful anodynes are sometimes advised by physicians to be put upon, or *hypodermically injected* near the seat of severe and ob-

stinate neuralgic pain. For *Home Medicine,* I venture only to repeat what was said about *rheumatic joints;* that a rag soaked in *Laudanum,* laid on the part and covered with oiled silk (or oiled paper) will often *stupefy the nerves of the part* so as to quell the pain. Anodyne *liniments* are often used with advantage. I may mention one which is moderate in strength and safe (applied **outside only**): mix *one drachm* of *Chloral Hydrate* with *four fluidounces* of *Soap Liniment.* This is to be gently rubbed in, for a few minutes at a time, over the part affected with pain.

Pain at the time of **menstruation** (*dysmenorrhœa*) is habitual with some women, and occasional with others. For its *prevention,* those liable to it should *keep quiet* for a couple of days *before* the expected time, and *then* for another day or two. When the pain has commenced, the proper position is *lying down.* *Warmth,* not excessive, but enough for entire comfort, is also needful. *Hot drinks,* such as *Ginger-tea,* or hot water with a little *Essence of Ginger* in it, or a teaspoonful of *Compound Spirit of Lavender,* will be suitable. So will *Spirits of Camphor,* or *Camphor Water,* and, in *bad* cases, *Paregoric,* or even (carefully) *Laudanum.* Cloths wrung out of *hot water* may be applied to the lower part of the abdomen. Very severe suffering of this kind may, in rare cases, call for injection of Laudanum into the bowels; of which again hereafter.

Piles (small lumps at or near the *anus, i. e.* outlet from the lower bowel) are sometimes very painful, especially at or after the time of movement of the bowels. *Constipation* should be avoided, as far as possible, by those who are troubled with piles, and yet *purging* actively will not agree with them. *Rhubarb* is the best laxative in such cases; or Sulphur; *not* Magnesia.

Inflamed piles may be soothed, if much heated, by application of very *cold* water. Yet, contradictory as it seems, *warm,* or moderately *hot* water, will give still more comfort in some cases. A flaxseed poultice into which a teaspoonful of *Laudanum* has been poured will be suitable when the patient is in bed with a bad attack. An *ointment,* as Cold Cream (of the apothecary), should be frequently applied. It is well to know that an attack of pain and soreness in piles (which are often present without giving much trouble) may be many times *prevented* by the *early* and *free* anointing of the parts with Cold Cream, Tallow, or Lard.

Fissure of the Anus is a still more distressing affection, our further reference to which may be best left over for another place.

Strangury (pain in passing water) is to be treated by the *warm bath*, or *hip*-bath (sitting-bath), followed by application over the bladder, or between the thighs, of cloths wrung out of *hot water*. Also, taking *Camphor Water*, and *Flaxseed Tea* containing a little Sweet Spirits of Nitre, as a drink. Severe cases may justify an injection of Laudanum into the bowels, or the placing in the lower bowel of a *suppository* of Opium (of which hereafter again).

Under the name of **anodynes** (pain relievers) several other drugs are named in medical books. We need only *mention* here Hydrate of Chloral, Belladonna, Hyoscyamus, Stramonium, Cannabis Indica, and Chloroform. Every one knows, also, what a boon to those who have to undergo surgical or dental operations is the *breathing* (inhalation) of **anæsthetics**, as Ether, Nitrous Oxide, and Chloroform. These are called by that name because they *annul sensation*, for the time. For extracting teeth, pure Nitrous Oxide is the best; for larger operations, Ether is much safer, though less convenient, than Chloroform. The use of either, in this way, requires much skill, judgment, and care.

Composing Nervous Disturbance.

What this requires depends very greatly on the cause and nature of the trouble.

A wakeful and fretful babe, for example, may need simply to have a part of its clothing changed, or to be fed, or made more comfortably warm, or to have its gums lanced. Do not resort to Godfrey's Cordial, or Mrs. Anybody's Soothing Syrup, for restless babies. A little *Fennel-seed Tea*, or a drop of *Essence of Peppermint* in a small drink of sweetened water, or a teaspoonful of *Camphor Water* (not *Spirits* of Camphor in such a dose) or the same of *Milk of Assafœtida;* either of these will be a good and safe infant's soothing draught. Overloading the stomach by keeping the child at the breast all night will have the opposite effect, making it worse instead of better.

For infants, as well as older persons, nervous disturbance may vary all the way from slight fidgeting to fits or *convulsions*. Mild medicines for moderate degrees of, for example, "hysterical" nervousness, are *Assafœtida, Camphor, Valerian*, and *Hoffmann's Anodyne*. Physicians often prescribe also, *Bromide of Potassium* (or of Sodium), *Musk*, and others.

Convulsions are very much more common in children than in grown people; and most so of all at teething time. They are least dangerous during infancy, but are always frightful. Just now, we are concerned only to speak of *composing measures* adapted to them. The same apply generally at all ages, so far as the attack itself is concerned. What is to be done between times to prevent or ward them off, is an important and often difficult question for even the physician to answer.

When a child "has a fit," lay it upon a bed, loosening all its clothing, especially about its neck. Have good fresh air in the room, but also sufficient warmth. Let one or two persons make two mustard-plasters, one for the stomach and one for the back. Get a warm (almost hot) bath ready. If the plasters are prepared first, put them on; if the bath first, let them wait, and place the child in the warm water at once. In the last case, also pour gently *cold* water over the *head* while the child is held laid in the bath. The mustard-plasters (whether first or second in time) are only to stay on long enough to *redden, not blister*, the skin. This should be ascertained by looking under the plaster every few minutes. A *very little while* will be enough to redden and burn a child's skin if the plaster be *strong* of mustard. But it will be better for it to have, for an *infant*, only *one third* part of mustard, the rest flour or Indian meal.

After the bath, have got ready a mixture of soap and hot water, and

into a teacupful of this put a dessertspoonful of Milk of Assafœtida (if at hand) and a teaspoonful of Castor- or Olive-Oil. Let this be thrown into the bowels with an injecting syringe; a towel being then held for a little while against the fundament to prevent the injection from escaping at the moment.

By the time these things have been done, if not before, the Doctor, if sent for when the attack began, as he should be, when accessible, will have arrived; and, if the attack has not yet passed by, he must say what else will be proper in the treatment. If the newly coming teeth are troublesome, it may be hoped that he will lance the child's gums. Adult men and women rarely (although they do sometimes) have convulsions, except those which are either **hysterical**, **puerperal**, or **epileptic**. The principles of management of *hysterical* and *epileptic* convulsions, during the *attack*, are essentially the same as for that of infantile convulsions. Treatment *between* attacks is a more difficult affair—to be conducted by those who are skilled in medicine. *Puerperal* convulsions (that is, occurring during labor, or after child-birth) are more peculiar, and ought always to have immediate attendance from a physician. Few cases of illness are more serious and critical than these; not only in appearance, but in reality.

Promotion of Sleep.

What a great need is this! Whoever has *fought* for sleep (as the author has) for scores of nights, may appreciate it. If a single night could be taken alone, we might, as a rule, make short work of it, and force slumber by a good large dose of some *opiate*, as Laudanum, or solution of Morphia. But then, the next day, and the next night, and the next! So we have to look forward, and, for the best result in the long run, rather persuade than try to compel "coy" slumber.

When sleeplessness comes as one of the symptoms of a disease, it may not have to be dealt with *by itself*, at least by medicine, unless it be more prolonged and distressing than usual. In all such cases, however, and indeed in *every case* whatever, *quietness* is indispensable, through the evening and night. Little or no *light* should, during the night, reach the eyes of the patient; if *accustomed* to *darkness*, it will be best.

If difficulty of sleeping (*insomnia*) result from nervous disturbance, exhaustion, over-study, or anxiety, *management* should always be perseveringly tried before resorting to drugs so powerful as the sleep-producers (*hypnotics*, *narcotics*).

Very *light*, easily digested *food* should, under such circumstances, make the last meal of the day. Yet a person not strong will sometimes be kept awake by having an *empty* stomach late at night. A cracker, a drink of sugared water (a French beverage), or a small wine-glassful of beef-tea, may then make a better night. No excitement of the *brain*, as by reading or continued conversation, should be allowed for two hours before usual sleeping time. Being read aloud *to*, if the book be not too interesting, answers in some cases; but an objection to it is that it requires the presence of more light than is desirable.

Mothers and nurses often *sing* their babies to sleep. That is a very good expedient, and may now and then succeed even with a grown person.

Exercise, in moderation, and in proportion to one's strength, may be very well taken in the evening to promote sleep. A walk in the open air will do, or a few minutes' flourishing of not too heavy dumb-bells. Getting *a little* tired makes one sleepy; while real *exhaustion* has the contrary effect.

Position is not without influence. Naturally we lie down to go to sleep. But, did you never feel "dreadfully drowsy" while down-stairs in the parlor, and then, after going to bed, get as wide awake as if it were morning? In fact, during sleep, *less blood flows through the brain* than while awake. In the sitting posture, gravitation (weight) tends to relieve the brain of much blood-pressure; when we lie down, more blood flows

into it. If all is healthy, we get asleep nevertheless; but not always when predisposed to sleeplessness. Best, therefore, in such cases, will be an *inclined* posture in bed, with the head and shoulders somewhat raised, in as comfortable a position as possible. When real sleepiness comes on, one may then lie down as usual.

Some people imagine, that if they cannot get asleep at once, they might as well be up and doing something, reading or writing, or walking about. This is a *very great mistake.* If not *sound* asleep, or even far enough towards that to entirely lose consciousness, we may yet get *a good deal of* rest in *partial* sleep; and the *more of this we get the better,* in the saving and renewal of strength. Keep still, then, in the dark, with closed eyes, and try to dismiss active thought. Count 100, 200, 300; repeat doggerel verses, as wrong as you can misremember them; watch imaginary sheep jumping over fancied stiles, one, two, three, four, and on, to twenty-five or fifty. Fight your eyelids; after a while, the brain-vibrations, like those of a bell that has been struck, will lull by degrees, and sleep may come at last.

Hardly without a doctor's advice, if that can be procured, ought any one to take strong sleep-compelling doses, such as *Hydrate of Chloral, Laudanum,* or *Solution of Morphia. Lactucarium,* which is obtained from the garden lettuce, used for salad, is much milder than opium; and Camphor Water will, when mere nervous restlessness is the matter, often compose so as to allow of sleep. *Hoffmann's Anodyne* is similar in its effect, and *Tincture of Hops,* or a tea made of hops, is very quieting. Even a *hop-pillow,* made by sprinkling hop-leaves with alcohol and binding them in a pillow-case, will sometimes bring the tossing head to rest. As to the effect of the old English "night-cap," a glass of whisky, or the less dangerous ale or beer, for sleep-producing, I am afraid to say anything, lest the too perilous temporary remedy might prove at last worse than the disease.

Purgative Medicines.

A large number of drugs act upon the bowels; **cathartics** is a technical name for these. Only a few of them need to be considered in connection with our present plan.

Rhubarb is adapted to a greater variety of cases than any other medicine for the simple purpose of *relieving constipation*. *Simple Syrup of Rhubarb* is very good for this use with babies. Younger yet, however (under a year), *Sweet Oil* (olive oil) is mildest of all, unless it be *Manna* or *Glycerin*. *Fluid Extract of Senna*, with one drop of *Oil of Aniseed* or *Oil of Fennel* in a teaspoonful of it, is also a good infantile laxative. *Castor-oil* comes next, when a more active purge is wanted; or, when there is sourness of stomach, *Magnesia*.

At any age, *Magnesia* is the best **antacid** laxative. *Castor-oil* is to be preferred when *colic* or *irritation of the bowels* is present. [Give it in twice as much *Spiced Syrup of Rhubarb*, well mixed up.]

Saline purgatives are useful generally at an early time of attacks of sickness with **fever**. The author's generation, in childhood, were dosed for "a bad cold," or at the beginning of measles, etc., with Epsom Salts or Senna Tea; nasty, both of them. Nowadays, one may have, instead, *Citrate of Magnesium* or *Tarrant's Aperient*. *Seidlitz* powders are of older date, but of similar cooling effect; and the same is true of *Rochelle Salt* and *Cream of Tartar*. *Pullna* and *Hunyadi mineral waters* please the taste of some. (On constipation in children, see p. 432.)

At the beginning of acute attacks of disease with fever, when all the secretions are "locked up," I believe that the use of some purgative medicine, especially of the saline kind, *is very serviceable and important*. This is true, as a rule, of *measles*, *scarlet fever*, *whooping-cough*, *small-pox*, and *varioloid;* and, with more discrimination of cases and moderation in doses, also of *diphtheria* and *typhus fever*. *Typhoid* fever has *diarrhœa* as an early symptom generally. If, in it, the bowels are exceptionally costive, only a *teaspoonful* of *Castor-oil* had better be ventured upon to relieve the bowels. In measles the bowels sometimes incline to be too free; but this should not prevent our making *sure* of their *full* movement during the *first two or three days*. When, after that, they become too loose, a weakening excess of purging may be checked by suitable means, such as will be presently mentioned.

For *habitual costiveness*, either chewing at bedtime a small piece of Turkey *Rhubarb Root* (as big as a pea), or taking at that time a *Rhubarb Pill*, will be the best thing to begin with. If that fails, take another piece, or another pill, also, before breakfast.

Compound Rhubarb Pills are *stronger;* they will, with most people,

purge rather actively. *Compound Cathartic Pills*, of the United States list, are too strong to use except when a *very decided purgation* is needed.

Often, when the mildest and least disturbing way of emptying the lower bowel is required, an **enema** (injection into the bowels) will be the best. For this, a simple and generally satisfactory mixture will be made by dissolving a thumb-sized piece of Castile soap in warm (almost hot) water, and stirring into this a tablespoonful of Molasses, a tablespoonful of Table Salt, and a tablespoonful of Olive or Lard Oil, or a dessertspoonful of Castor-oil. There are different kinds of injecting arrangements. With the most convenient, a person can (unless ill) wait upon himself. If too sick for this, or if only the old-fashioned straight syringe can be had, its point should be greased with lard, and then, the patient lying (best on one side) on a bed, it can be *very gently* introduced into the opening to the bowel to the distance of an inch or so, and gradually the liquid may be forced through the syringe. *Thoughtful common sense* will find no difficulty in this, even the first time.

Suppositories are sometimes yet more convenient, and are *least disturbing* of all; but they are not so sure to take effect, and their action does not extend far upward. A suppository is a small soft mass, prepared for the purpose; rounded, about as large as the last joint of a woman's little finger. Common *Brown Soap*, cut into such a size and shape, and dipped in castor-oil, or lard, may be so used. All that is to be done is to push it well into the anus (outlet of the bowel), and let it stay there.

After either a suppository or an enema has been introduced, the patient ought to try to retain it for some minutes, for effective operation.

To Check Diarrhœa.

Not every looseness of the bowels ought to be stopped at once by medicine. Sometimes it is a *relief* to a condition of the system which would involve a worse illness if it did not come.

Infants, especially, need to have the bowels moved two or three times daily; most of all while they are *teething*. We do not call it diarrhœa in them unless there are at least four or five *large liquid* passages in twenty-four hours. Of course when it *is* excessive it must be attended to, or weakness and exhaustion will follow.

Correctives, generally, should be the first things given in babies' diarrhœa. Sourness of stomach is commonly present with it; therefore *Lime-water*, being **antacid**, is particularly suitable. Another good corrective is *Spiced Syrup of Rhubarb*. On account of the *spices* in it, this article does not purge like Simple Syrup of Rhubarb; it only promotes an even, regular action of the muscular coat of the bowels, and so tends to get things right again.

Soda (*Sodium Bicarbonate*) is an antacid corrective, stronger in this effect than Lime-water; but less **astringent** or binding.

Cinnamon Water is a gentle astringent; so is *Camphor Water*. These do well to come next after Lime-water or Soda and Spiced Rhubarb, if the complaint is not corrected by them. Should it still be obstinate, more potent checking medicines will be needful. Of these, *Paregoric* and *Laudanum* have much power; but they must be used very cautiously, on account of their containing Opium.

Of the many *astringent* medicines employed by physicians, under whose advice, when it can be had, they had better be taken, we may mention here, as possibly wanted in home practice, *Chalk Mixture* and *Tincture of Catechu*. A desperate and exhausting diarrhœa, which resists all such treatment as has now been spoken of, may call for the use of a *Laudanum and Starch enema*. This is introduced with a *small* syringe, even for a grown person; the object being to have it *stay* in the bowel; just the opposite of what we want from a *purgative* injection. A syringe holding an ounce will do for this purpose for an adult; half an ounce for a child. Two or three drops of Laudanum, with Starch made not too thick to run, will be the infantile dose for such an enema (even less for a babe under a year old); thirty or forty drops of Laudanum, with less than an ounce of Starch, for a grown person.

Dysentery differs from diarrhœa, in having *many small* and *bloody* passages, with *straining* or *bearing down*, as well as pain. (Sometimes there is abdominal *pain* with or before each passage in diarrhœa.) The management of dysentery will be dealt with best in that part of this book (later on) which considers it among **Special Diseases.**

Sick Stomach.

As this occurs under a variety of circumstances, the *main* treatment of every case must depend upon its nature and cause. We may name, however, several remedies which will do good in *most* cases of nausea or vomiting, and which, therefore, it will be safe to use while awaiting medical advice.

Ice is one of these. It may be taken into the mouth in small pieces, and melted before swallowing. This is helpful in *nine out of ten* instances of sick stomach, and in the tenth case will do no harm.

Lime-water is beneficial in most of such cases; when nourishment is needed, it may be given in equal parts with milk, from a teaspoonful to a tablespoonful of each.

Effervescing waters (mineral-water, soda-water, Apollinaris, etc.), made cool with ice, very often assist in relieving nausea. When sea-sick, iced mineral-water will be likely to help more than anything else.

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When *weakness* is present, *teaspoonful* doses of **Brandy** or (the best) **Whisky** may be appropriate. The smallness of the dose is here especially important, and it need not often be repeated more than three or four times, at intervals of half an hour or so, unless *great exhaustion* is impending. Very seldom ought anything alcoholic to be ventured upon as a remedy without the express advice of a medical authority. It is an *edged tool,* of the most dangerous sort. *Children's* doses, of such and of *all* strong medicines, should be *very* small. *Ten drops* of brandy or whisky will be enough at a time (if needed at all) for a child of two or three years, where a teaspoonful would be given to a grown or nearly grown person.

Aromatic Spirit of Ammonia is reviving to one who is faint with sickness of stomach. It is *antacid* as well as stimulant.

Soda (Bicarbonate of Sodium) is *antacid,* but not stimulant. It is generally very comfortable to a disturbed stomach.

Warming stomachic doses for nausea are *Ginger, Cloves, Cinnamon,* and other **Aromatics** (spicy articles) in *small doses. Large* draughts of ginger, hoarhound, Chamomile, or Boneset tea, or even of clove or cinnamon infusion, will *bring on vomiting.* This is an instructive example of the *opposite* effects, often produced by the same thing, in *small* and in *large doses.* (This gives, however, no sort of support to the absurdity of the *infinitesimal* doses, the thousandth dilutions, etc., of Homœopathy.)

Sometimes, with constipation, or even, especially in summer, with commencing diarrhœa, small doses of **Magnesia** are composing to the stomach. The same is true of very small doses of **Calomel** ($\frac{1}{12}$ to $\frac{1}{4}$ of a grain), which, however, is another "edged tool," belonging to the physician's rather than to the home list of medicines. Still, out in the country, where advice cannot always be had in time, a family medicine-chest may very well have in it, among other things only for *possible* or *occasional* use, a small box or package of $\frac{1}{12}$*-grain Calomel Powders.* They may be serviceable particularly at an early stage of *summer complaint* in children.

Paregoric is the only other medicine needing here to be mentioned among those likely to assist in quieting a nauseated stomach.

Outside, an early remedy for vomiting may, in any case, safely be, a **Mustard-plaster** over the pit of the stomach. For a young child, a **Spice-plaster** will, for this purpose, be preferable; made by mixing together one or two teaspoonfuls each of several spices—as Ginger, Cloves, and Cinnamon, or half as much Red Pepper, with a similar amount of wheat or Indian flour; wetting these with whisky, and spreading them on a piece of muslin or thin flannel. This, when laid

over the stomach, should be covered with a piece of oiled silk or oiled paper or rubber-cloth, to retain its moisture for a longer time.

Indigestion.

A *much overloaded* stomach is best relieved by being made to throw out its contents under the action of an **emetic.** This is, however, a harsh remedy, not nowadays often resorted to. It is not easy to appreciate the *passionate* gluttony of the ancient Roman emperor; who would, after eating a luxurious dinner, tickle his throat with a feather, so that he might disgorge and begin again! (About the use of emetics, something will be said under **Poisons.**)

Ordinary indigestion requires, for one thing, to **give the stomach rest.** Let no food be taken for a number of hours; if the patient is strong enough, not for a whole day. Another "indication," as the doctors say, is to make sure that the **bowels** are open; to carry off the refuse of undigested or half-digested food.

Besides these important things, if the stomach is still *worried* and unsettled, the aids to nature which we may resort to are those just above-mentioned, as suitable for cases of nausea and vomiting. Small and few doses, however, are likely to be necessary for common attacks of indigestion. If, with these, there are *dizziness, headache,* a *yellow tongue or eyes,* and a bitter taste in the morning on awaking—a set of symptoms designated usually as *biliousness*—small doses of the old fashioned **Blue Pill** may be reasonably and safely given. I say *small doses.* When my father was a boy, the doctors gave Blue Mass and Calomel (the latter being *three times* as strong as the former) in ten to twenty grain doses. Even in families, such doses were very commonly taken for slight "bilious" attacks, without waiting for medical advice. As, in such quantities, these mercurial medicines almost always operate freely on the bowels, and so purge themselves off—this practice did not appear to do harm. It is, however, not now approved, as other *purgative* medicines are more available; Calomel and Blue Pill are now given in much smaller doses, and not nearly so often as formerly.

(The way in which they got their reputation for being injurious was by *medium* doses being given *too often,* and continued *too long.*)

Practically speaking, of Blue Pill, a small dose for indigestion, with signs of participation by the liver, will be *one grain* at night, and again the next morning; and perhaps again the second night. What I call **Compound Gentian Pills** may be taken for two or three days, if entire relief does not come sooner. This is their prescription, written doctor fashion:

℞. Mass. Ex. Hydrarg., gr. v.
Pulv. Rad. Rhei et Extract. Gentian, aa ʒj.
Ol. Caryophyll., gtt. iv. M. et
Div. in Pil. No. 20. S. One or two at once.

Which, done into English, reads thus:

Take of Blue Mass, five grains; Powder of Rhubarb Root, and Extract of Gentian, each twenty grains; Oil of Cloves, four drops. Mix these together, and divide the whole into twenty pills. One or two to be taken at once.

When there is lingering indigestion, after an attack, with some flatulence, the bowels not being sufficiently free, yet not requiring a strong purge, *two* of the above pills may be taken, *twice daily*, for two or three days; not longer at one time, on account of their containing a small amount of mercury. It would take much more mercurial medicine than that, however, to salivate anybody; unless it were that rare and uncomfortable individual who is one in thousands for susceptibility; one who might be made happy by Oscar Wilde's sunflower; or who would "die of a rose in aromatic pain."

We do not count upon such existing, unless we meet with them, and then they are to be managed all in a way of their own.

Continued Weak Digestion.

Expecting to say something about this later in the book, under the head of **Dyspepsia**, the remark may be made now, that the class of medicines which particularly *tone up* a weak and relaxed stomach are the simple **Vegetable Bitters**. Such are *Quassia*, *Columbo*, *Gentian*, and some others. *Simple* bitters we call these, because they have no other very positive quality except the bitter taste, and no marked effect upon the human system except as **tonics** to the stomach. (In *large* draughts, as already said, their infusions or "teas" will act as *emetics*.)

Some bitters there are which have *other* very important actions. **Quinia** is one, got from Peruvian Bark; it acts powerfully on the nervous system, and is the special remedy for malarial fevers. The same bark contains also Cinchonia, and several other more or less bitter tonic and *nervine* "alkaloids,"as the chemists name them.

Nux Vomica is a very powerful bitter nervine tonic. Out of it is obtained **Strychnia**, one of the deadliest of poisons, but also one of the most valuable of medicines, when used with judgment, care, and skill. With this information, we may venture to add that the *Tincture of Nux Vomica*, in ten-drop doses, twice or thrice daily, is one of the most effective of all the stomachic bitters, in cases of continued weakness of digestion, with flatulence.

These bitters generally improve the *appetite*, which is almost always poor when the stomach is otherwise weak. For the same end, as appetizers, **Mineral Acids** are useful; Dilute *Aromatic Sulphuric* Acid, for example, under the common name of *Elixir of Vitriol*, and *Chlorohydric* Acid, formerly, and sometimes now, called *Hydrochloric*, or Muriatic Acid. *Nitromuriatic* Acid adds a special tendency to act upon the liver. One or other of these acids, and most of all the last named, is often given to the subjects of prolonged indigestion, along with the vegetable bitters.

To Reduce Inflammation.

A serious task, this is, in many instances; taxing the doctor's skill, and not very rarely baffling him. How, then, can one say anything about it in a work on **Home** Medicine? A few clear principles seem to be all that can be here spoken of, referring the reader for a larger discussion of the subject to treatises designed for the medical profession.*

Inflammation (as already said in that part of this book which dealt with the **nature** of diseases) may affect any organ or portion of the living body. When it attacks one of the more *important* organs, as the *brain, spinal marrow, lungs, heart, liver, kidneys, pleura, peritoneum* (see **Anatomy**), or even extensively involves the *skin*, life may be endangered by it. If only a small part, as an eye, ear, hand, or foot, is inflamed, there is usually much less danger, though there may be a great deal of suffering. Moreover, an inflammation may *spread*, as from the ear or the eye to the brain; or some *poisonous* (septic) matter may be formed in the inflamed part, and, by *blood-poisoning* (*septicæmia*), the whole body may suffer and perhaps die. Septicæmia is very often fatal, but a vast multitude of people have inflamed hands, feet, eyes, noses, jaws, etc., without either it or the allied disorder, Pyæmia. The liability to such *accidents* of inflammation is greatest where the *atmosphere* of the *place* is *foul.*

Taking a broad general view of inflammations as a class of disorders, it may be said that they have *three stages*, or progressive changes.

First comes **excitement.** *Towards* the centre of the inflamed part, the arterial blood-vessels beat and throb; being roused to endeavor, so to speak, to overcome the obstruction there. Heat, redness, swelling, and pain, all belong to this stage.

Then follows **exudation.** This is the forcing of some of the fluid portion of the blood (often with some of the *white corpuscles;* occasionally also a number of the *red corpuscles*) out, under the *pressure* of the excitement and resistance together, through the walls of the vessels, into

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* See "Essentials of Practical Medicine," Section on *General Therapeutics.*

the substance of the part. If this fluid is *thin*, it may collect as a "serous effusion;" such as is frequently the result of pleurisy. When *thick* and *adhesive*, it glues parts together (*plastic lymph*); this happens in the pleura, in the peritoneum, in the pericardium, and in the membranes of the brain (see **Anatomy**). If, again, there are many white corpuscles in it, and the vitality of the part is disturbed much, *pus* is formed; we have **suppuration**; with either an *abscess*, or, at once, a yellowish or greenish purulent *discharge* (as in severe *bronchitis*).

This is *one* way in which the three stages of inflammation may follow one another. But, differently from this, there may be the *first* stage of **excitement**, and the second, of **exudation** (effusion), with, for a third, instead of suppuration, **gangrene**, or *mortification*.

Happily, also, the *most frequent* of all is better than either of these; of which, of course, the last named is the worst. We may have inflammatory **excitement**, and moderate or small **exudation**, followed by **resolution**; that is, the inflammatory process *ceasing*, without either suppuration or gangrene; and the part and the patient getting well; with very little damage resulting; except that both the part and the general system are somewhat weaker than before.

Now, what can be done by *treatment* against the going on of inflammation to its worst (gangrene), or the next worst (suppuration), or the third in seriousness (liquid effusion)?

We can attack it in the first stage of **excitement**, with, in many cases, very good effect. This is what we mean by *reducing* inflammation; moderating the violence of the conflict between the surrounding throbbing blood-vessels and the obstructed centre, so that the least possible damage shall be done by it.

For this purpose, the means available in different cases are, chiefly, these:

Rest; Position; Cold; Diet; Purgation; Blood-letting; Cooling Medicines; Nervous Sedatives; Counter-irritation.

Rest of the part is indispensable in all inflammations. When the part is small, and is not used in moving about, the body need not be absolutely confined. If it be otherwise, as when an ankle is inflamed from a severe sprain, and still more when a lung, or the pleura, or a bowel, is so affected, the rest must be complete, in bed. Carrying a sore hand in a sling rests it; covering an inflamed eye with adhesive plaster closing the lids, or remaining in a darkened room, gives it repose. But any one with an inflamed *lung* must be kept *as still as possible;* and must not even speak, unless in a whisper. If the *brain* be inflamed, *quietness* and almost *darkness* will be necessary, to avoid *mental* as well as bodily disturbance.

Position can be made to help when a *hand* or a *foot* is inflamed. By keeping the part *raised*, the tendency of blood towards it will be lessened advantageously.

Cold is often a powerful *antiphlogistic*, as old writers called whatever tends to reduce inflammation. It must, however, be *steadily* applied, to have this effect. *Dashing* cold water on a part and then leaving it, in a place not itself freezing cold, will, from *reaction*, make it warmer than before. When the brain is inflamed, a good plan is to shave the head, or at least cut the hair very short, and keep it half covered with light rags soaked in ice-water. For steadiness of effect, the rags must be dipped in the cold water *every few minutes*. A more effectual method, more convenient, however, for the abdomen than for the head, is to lay over the inflamed part a *coil* of light *rubber tubing*, through which cold water is made to pass. This is done by placing one end of the tube in a vessel of water somewhat *higher* than the body, and allowing the water to pass out at the other end, which is placed lower.

Diet was formerly much relied upon, and *low* diet was made very low—almost to starvation. We know now, that inflammation is possible in feeble as well as in strong bodies. Not every one can bear doing long without food, or even with too little food. Also, strength is necessary to *shake off* disease, so to speak. It is not strength, but *excitement*, that we want to reduce. A really low, thin diet, therefore, is only suitable for a *strong* person, and for even such a one, not for many days together, during illness. It is important, however, when *fever* is present, with which the power of *digestion* is always weak, to give food in a *simple, liquid form*, so as to give the stomach no trouble in appropriating it.

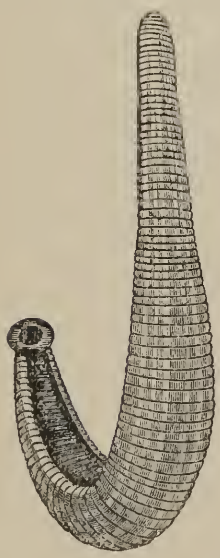
Purging medicines act like an unstimulating diet, in cooling the blood, and thus promoting a quieter action of the heart and arteries. This favors the reduction of the excitement which attends a violent inflammation of any part. The cathartics which have the most effect of this kind are the *Salines*, as Epsom Salts, Rochelle Salt, Citrate of Magnesium, Cream of Tartar, etc.

Taking blood, either from a vein in the arm (venesection) or by leeches or cups, from an inflamed part (local blood-letting), is a very ancient remedy. Once overmuch used, the reaction in our time has gone quite too far against it. It is a *very valuable* means of reducing inflammation. This language is confident, because based on experience. I was brought up under the régime of the lancet. My father, Dr. Joseph Hartshorne, was, with a very large practice for many years, a frequent bleeder. He was a pupil of Dr. Benjamin Rush, who has been called (not very justly) the American Sangrado. Before I was of age, my two arms bore the scars of thirteen bleedings, at my father's hands,

besides many dozens of leeches having drawn their fill from my supply of blood. Yet I "still live," although I have passed, since maturity, through the dangers of a bad dissecting wound and of an attack of typhus fever; and, like others of my much-bled contemporaries, I have now as good health as need to be, in the early part of the second half century of life. In fact, there have been, in my knowledge, more people going on to their eighties and nineties of the generation of the bleeding-bowl and the lancet, than there seem likely to be in the present time, when these appliances are, with many physicians, obsolete. We may see, however, evidence that the "wave" of reaction against bleeding is subsiding. Many leading physicians, both in Europe and in this country, have now the sagacity to see that, while our fathers bled oftener and more than they needed to do, yet *there is a place of importance for blood-letting*, local and general, especially in the treatment of the *early, excited* stage of *violent inflammations.*

During an experience of twenty years in the practice of medicine, I have bled many people, and had leeches and cups applied to many more; and I never once had occasion to believe that these remedies were otherwise than useful to my patients. Still, it is by no means all cases of inflammation, even of the great vital organs, that need, or all constitutions that bear, the loss of blood. It is a matter for careful judgment in each case.

FIG. 178.



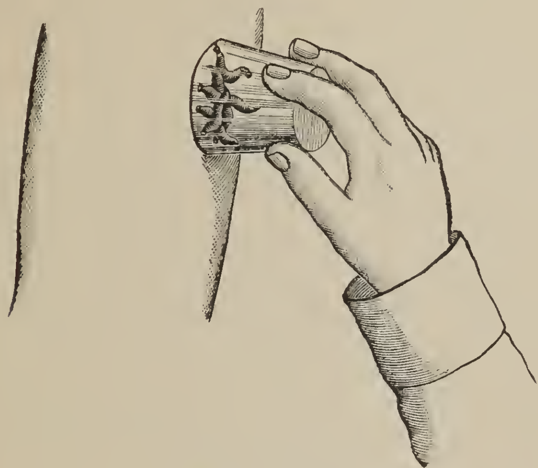
A LEECH.

Few persons who have never seen a vein opened will feel like bleeding any one themselves. It may be mentioned, however, that a full bleeding for a grown man from the arm will be about twelve ounces; for a woman, ten ounces. When a child is bled, if ten years old, four ounces; if five years old, three ounces will do. In using leeches, it is to be remembered that each leech will draw, on the average, a teaspoonful of blood. *American* leeches (making the smallest bite) are always best for children, and for adults anywhere unless on the hand or on the back. European leech-bites sometimes bleed more freely than is desirable if applied on the neck, etc.

Cut cups draw blood according to their size and number. They are more painful than leeching, which, indeed, gives no pain of any account. Leeching should be preferred upon parts that are tender to the touch; cups are especially available on the *back*. The cup is a small round glass

from which the air is exhausted; sometimes by a pump applied to its top. Being placed closely upon the skin, this drawing out of the air makes the parts *swell* under the cup, and become there *full of blood.*

Fig. 179.



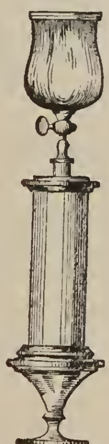
LEECHES APPLIED.

Then the cupper takes off the glass, and, with an instrument made for the purpose, scarifies the blood-filled surface at several places. Then

Fig. 180.

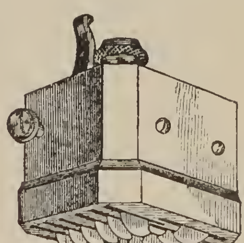
CUP, WITH ELASTIC TOP.

Fig. 181.



ANOTHER FORM OF CUPPING APPARATUS.

Fig. 182.



SCARIFICATOR.

the cup and pump are reapplied, and half an ounce or so of blood is withdrawn by each.

Dry cups draw blood *to* the surface on which they are placed, and

so help to relieve a loaded or inflamed organ beneath it. This is often very serviceable. It is easy to arrange for dry cupping without any special instruments. Take a number of egg-glasses, or lemonade-glasses—anything smaller than tumblers. Put under each (one at a time) a small bit of paper, doubled up and dipped in alcohol or whisky, first lighting the paper, at a candle or otherwise. The heat of the burning paper drives out most of the air in the glass; when put down on the skin, the flame goes out for want of air, so that it does not burn the part. Cooling at once, the air left in it contracts, shrinks, and so draws up the skin, with blood in it, just as is done with the cup and pump.

When dry cups are used, it is commonly well for them to stay on a good while (fifteen or twenty minutes), to make a decided impression, in the diversion of blood to the surface.

A *mechanical leech* has been invented, and is sometimes successfully employed, to take the place of natural leeches when they cannot be obtained.

For inflammation of the lungs, pleura, brain, or bowels, local withdrawal of blood by leeches or cups is, I believe, sometimes a very important part of the treatment.

Cooling (sedative) **Medicines** are in place chiefly in inflammatory affections of the breathing organs, as pneumonia, bronchitis, and pleurisy. *Tartar Emetic* is the most powerful of these. Once it was very largely used. Its harsh action upon the stomach and bowels has caused it to be now given mostly in very small doses; from the one-sixteenth to the one-fourth of a grain only, for adults, at an early stage of a violent inflammation attended by fever. Tartar Emetic is not suitable to be used as a domestic medicine.

Ipecacuanha resembles it in its disposition to bring on vomiting, but is very much milder and safer. Ipecacuanha is a very proper article for family use, under many circumstances.

Nitrate of potassium is a sedative, cooling medicine, not now very largely used by physicians. *Digitalis* was once considered a sedative; now it is called a *tonic* to the heart. *Ergot* has great popularity in the medical profession at the present time, in the treatment of subacute inflammatory troubles, particularly of the spinal marrow. None of these last, Nitrate of Potassium, Digitalis, or Ergot, can be advantageously used without medical advice.

Some **nervous sedatives** are important in their secondary effects upon inflammation. The nerve-centres have much influence over the movement of the blood.

Aconite is one of these. It is a strong poison in any but very small doses, and must be used only with the greatest care. *Tincture of Aco-*

nite is the common preparation. Its dose is from half a drop to one or two drops, in water, every one, two, or three hours. Some physicians of experience give it in almost all cases of inflammation of the lungs, pleura, etc., even in children. If it is kept in the family medicine-chest, it should be distinctly marked **Poison.**

Opium has obtained a very large place in the treatment of one dangerous inflammation, that of the peritoneum (*peritonitis*), which lines the whole interior of the abdomen. Opium tends to constipate the bowels, and powerfully affects the brain. It also tends to diminish secretion in the air-passages, and therefore it does not appear to be suitable, at least at an early stage, in inflammation of the *bowels*, *brain*, or *lungs* or in *acute bronchitis*. After the *excitement* has subsided, in *dysentery* and in *bronchitis*, perhaps sometimes in *pneumonia*, it may aid in allaying pain and checking excessive discharges.

Counter-irritation is a term which explains itself. Endeavor is made to draw blood and nervous excitement from an inflamed part by a harmless irritation or inflammation somewhere else. *Blisters* are strong means of this kind. A blister is raised by leaving on the skin for a time a plaster made of Ointment of Cantharides; or painting the part with Cantharidal Collodion, and covering it, while moist, with a piece of oiled silk. With a child, an hour or two will generally be enough to allow the Cantharides (Spanish Fly) to act. In a grown person, it may require three, four, or more hours. There should always be a piece of gauze between the skin and the blistering plaster, so that it can be entirely removed at the proper time. When it is taken off, the scarf-skin (cuticle) being raised in watery swellings, these may be pricked with a point of any kind, to let the water out. Then there should be placed over the sore surface a piece of muslin or lint thickly spread with Simple Cerate, to heal it up in two or three days.

The time for blistering (which is only called for in rather bad attacks of internal inflammation) is not at the beginning of the case, but after the excitement of the circulation has ceased. The disorders, in the course of which, at such a stage, a blister is most likely to do good, are *inflammation of the brain*, *pneumonia*, *pleurisy*, and *membranous croup*.

Other modes of counter-irritation (better, perhaps, called *derivation*) are, painting the skin with *Tincture of Iodine;* rubbing over a small surface a drop or two of *Croton Oil;* or with a little *Tartar Emetic Ointment*.

Painting with Iodine is a milder measure than blistering with Cantharides; and it may be resorted to in a greater number of cases, of moderate violence. Croton Oil and Tartar Emetic Ointment are only

employed in *obstinate chronic* cases of irritation of internal organs. They produce very sore, pimply, or pustular eruptions.*

Fever.

Reminding the reader of what was said, a few pages back, of the *nature* and *signs* of fever, it may be said now, that what we want to do when those signs (*heat, excitement* of the *circulation, locking up of secretions*, and *weakness*) are present, is, first and chiefly, to ascertain and remove, if possible, the **cause** of the attack. If this cannot be done, instead of it, or if it can be, then along with that endeavor, we should try to **lessen** the **heat**, promote the **return** of the **secretions**, and **support** the system through its period of **weakness**.

To diminish the excessive heat, **cold water** is the great remedy. Almost incredible it seems, that physicians were once afraid to give cold drinks to patients suffering with raging fever. A man with small-pox, two hundred years ago, was shut up in a close room, with red curtains hanging about his bed, blankets piled on him to promote perspiration, and, for the same end, only hot and bitter drinks, herb teas, were allowed him! All the world knows better now, and follows nature's pointing better than that. *Thirst* is an almost universal symptom of fever; and frequent draughts of cold water are its best remedy. Ice-water is not the best, at least if the draughts craved and taken are large; it may be, to the most advantage, of about the temperature of deep † well water; about 50° to 52° Fahr.; although nearer the freezing-point will answer well. If the stomach is very irritable, as is often the case in autumnal remittent and in yellow fever, small lumps of *ice* melted in the mouth and then swallowed, at short intervals, will do better than drinking much water at a time.

Cold water **outside** is a remedy naturally thought of; and it may be used, but carefully. *Sudden chilling* is not safe. Some physicians, especially in Germany, now treat cases of typhoid fever by immersing the patient for ten minutes at a time in a really cold bath. This seems to me not a plan to be approved. But the sponging of the face, arms, hands, and, part after part, the whole body, with cold or cool water, two or three times a day, is an admirable means of relief in fevers generally. Its service is perhaps most marked in scarlet fever, when

* If either of these should be used, great care must be taken not to get the oil or ointment into any one's *eyes*. A patient of mine nearly blinded himself by neglecting this precaution; putting his fingers to his eyes just after rubbing croton oil upon a part of the skin.

† *Very* deep (Artesian) well water is much warmer than this; the temperature increasing with the depth, after the first forty or fifty feet.

the surface of the body is often intensely hot; the whole skin seems to be inflamed. Bear in mind the great principle: we want to temper, to moderate the excessive heat; not to chill the body below its normal degree.

Certain additions to water as a drink will contribute to its refrigerant action. *Acids* have this tendency. *Lemonade* and the juice of *oranges* are generally suitable. *Citrate of Potassium* and *Acetate of Ammonium* are the medicines most sure to be safe and beneficial for the same purpose; the former when the bowels are natural or constipated, the latter when there is a disposition towards diarrhœa.

Of the secretions, those of the **bowels, skin,** and **kidneys** require attention in fever. In most cases of *typhoid* fever and some cases of *measles,* the bowels incline to looseness from the start. When, in those diseases, they are not moved at all during the first day of the fever, a small dose of a mild purgative may be given; in typhoid fever, a teaspoonful of Castor-Oil; in measles, a teaspoonful of Citrate of Magnesium (solid), or a half-wineglassful of effervescing Solution of Citrate of Magnesium; or a teaspoonful of Rochelle Salt.

These are exceptional febrile diseases. In *Remittent* (autumnal, bilious, malarial) fever, a good brisk purging early in the attack with a saline medicine, such as Citrate of Magnesium (an even tablespoonful, solid, or a wineglassful of the solution, repeated in six hours if it does not operate) or Rochelle Salt (a tablespoonful), will be pretty sure to be useful. *Typhus* fever requires caution, in expectation of great weakness; half of the above doses will be best for its treatment. *Scarlet* fever should be, as a rule, the occasion for a good cooling saline dose on the day the attack breaks out. Dr. Joseph Hartshorne, who had a very large experience in Philadelphia, used to say that the chief reason why some cases of scarlet fever and allied diseases had troublesome late symptoms and *sequelæ* (after effects) was the neglect of proper evacuation at the beginning. Purgatives at that stage help to clear out from the bowels and from the blood impurities which, while they remain, are poisonous to the system.

But real *purgation* belongs in fevers, as a part of the treatment, only to the early stage. After that, we need merely to see that the bowels are not constipated; a daily moderate movement will suffice. Some persons suppose that because a sick person takes only small quantities of food, he does not need to have his bowels open at all. But the *waste* of the substance of the body is going on even faster than during health, and the discharge from the bowels comes from this waste as well as from the refuse or excess of food.

Dryness of the skin is a regular symptom of fever. The most fre-

quent exception to it is in the febrile state of *inflammatory rheumatism;* in which the skin, while hot, is sometimes quite moist. Generally, the dryer the skin, the worse; the coming of moisture shows the subsidence of the fever. The high heat and dryness are connected together. Reduce the temperature, and perspiration will break out. Therefore, the **cold drinks** and (careful) cold washing and sponging, spoken of as appropriate to lower the excessive temperature, will serve also to restore the secretion from the skin. Citrate of Potassium, Acetate of Ammonium, and some other medicines favoring this effect, are called *diaphoretics* in medical books.

Diuretics are agents which tend to increase the action of the kidneys, the flow of urine. They are among the more uncertain remedies; they do not always act as we wish them to. In this they differ very much from purgative medicines.

The *salines* already mentioned (Citrate of Potassium and Acetate of Ammonium) as *diaphoretics* are commonly *diuretics* also. So are Cream of Tartar and Sweet Spirit of Nitre. The latter is very often given in fever, when the amount of urine passed is small. Do not forget that sometimes, in *low* fevers, the bladder is full, but the patient cannot empty it. This must be examined into. If there is *retention* of urine, it must be drawn off with a *catheter.*

Weakness, in fever, is not quite the same thing early in the attack as towards its end. In the first place it is an oppression of the system; after a while there is more or less exhaustion. The first is best relieved by the evacuating (unloading) means above referred to; purgatives, diaphoretics, diuretics. At that stage, with persons of average strength, the amount of food taken may be small and its character light. (Persons always feeble will need to have concentrated food from the beginning.) As the attack goes on, even towards the end of the first week usually, and in scarlet fever and small-pox sooner, the system loses strength, and support is necessary. What shall the means of that support be?

Liquid, strong food in small quantities and often is the rule. **Milk** (with lime-water in it if the stomach be very weak) and **beef-tea** are the things to stand by. Strong mutton broth and chicken soup (with all fat fully skimmed off) will do for variation.

Supporting treatment for great debility has always, with physicians, included the use of something alcoholic, wine and whisky being mostly preferred. Opinion in the medical profession on this subject has tended of late years (in the minds, at least, of its safest leaders) towards a lessening of the amount of alcoholic stimulation in fevers, and towards resorting to it in fewer cases. Once it was almost a universal practice

to give whisky in all cases of typhoid, as well as of typhus, fever. Now, many cases of typhoid fever are found to get through well without it. Typhus is attended by more positive depression; yet in my own person, attacked while a resident physician in Pennsylvania Hospital, typhus was treated without alcohol, except one wineglassful of wine whey, which, as it did not seem to agree well, was not repeated.

On such an important matter, in every actual case, the judgment of a physician should be obtained. The safest rule in **Home** management of the sick will be (unless in extraordinary emergencies) not to give or take alcohol in any form unless advised by a competent physician.

Cough.

How many different kinds and causes of cough there are, we have already mentioned when considering it among the symptoms of disease. It cannot be treated exactly alike under all these different circumstances. As a symptom, however, it is unpleasant, and often wearisome; and it is well to know of some domestic remedies which are safe and useful in many cases.

First, a dry cough must be softened and **loosened.** The three best home remedies for this purpose are **Ipecacuanha, Squills,** and **Wild Cherry Bark.** Of the Syrup of Ipecacuanha, for this effect (not to cause vomiting) the dose is from a quarter to a half teaspoonful. Of Syrup of Squills, which does best at a later stage than Ipecac, half a teaspoonful to a teaspoonful. Of Syrup of Wild Cherry Bark, a teaspoonful. This last may be given along with Syrup of Ipecac at first, and with Syrup of Squills afterwards.

There is also real usefulness in the soothing effect upon cough of **Licorice,** and of pure and well-made *candies;* hoarhound candy for example. The advantage of these is that a little of either can be taken very often, so as to keep up a nearly constant influence of the kind desired. Although such things only touch the swallowing part of the throat (*pharynx*), not the wind-pipe (*larynx*), yet the nearness and sympathy of these two surfaces cause the extension of the effect from one to the other. Spencer's *Chloramine* pastilles are useful in this way.

After loosening, a wearisome cough may need to be **quieted.** This must be done with care, since to stop secretion and dry up a cough will make things worse. **Opium** and its preparations, including of course **Morphia,** have the most power of this kind. They are often added to cough-mixtures, to be used after free expectoration of phlegm has come on. Wistar's Cough Lozenges, when made after the regular formula, are composed chiefly of Licorice, with a little Opium added. **Syrup of Lactucarium,** also, is quieting to cough, and is a milder narcotic

than Opium. It may be used sooner and with less apprehension of excessive effect. **Compound Tincture** of **Benzoin** often has a very good effect, in fifteen to twenty drop doses, each dose taken on a lump of sugar. About other medicines adapted to particular kinds of cough, something will be said in connection with special diseases. A full account of them is given in all works on *Materia Medica*, under the title of **Expectorants.**

Hemorrhage.

What causes bleeding must always be the first question. If from a wound, it will come under **Accidents** and **Injuries**, to be considered in the latter part of this book.

If a symptom of a disease, the necessity of treating the disease rather than the bleeding is plain. In such a case, only a large and weakening hemorrhage calls for special measures on its account. This is true of the bleeding at the *nose* in the first week of typhoid fever, *spitting of blood* in consumption of the lungs, *vomiting* of blood in ulcer of the stomach, and bleeding from hemorrhoids or *piles*. If hemorrhage from the nose, stomach, or lungs takes the place of the monthly flow in women, we are less concerned to stop it than under other circumstances.

It is well to state clearly that there are no remedies which are always certain to stop bleeding from any internal cavity of the body.

Nose-bleeding.

Often this is rather relieving than otherwise, in full-blooded young people, who without it would have had headache. The occasion for stopping it comes when it is so large in amount, or continues so long, as to weaken by loss of blood.

How shall we stop it? Tell the patient to avoid blowing his nose. *Clotting* (coagulation) is the natural way of stoppage of all hemorrhages. Bathe the forehead and outside of the nose and cheeks with cold water, or apply *ice* to the forehead (not too long at once, but enough to cause the impression of decided cold); or, if this does not suffice, to the back of the neck.

Put a plug of cotton well into the nostril from which the blood comes. If first dipped lightly in a strong solution of Alum, it will be more effectual. Let the person keep quiet, with the head and shoulders raised. Holding both hands high above the head is said to help to stop bleeding at the nose.

Only one in a very large number of cases will be really dangerous. When all the above measures fail, a physician will be needed, who will effectually plug the bleeding nostril. For this a watch-spring arrange-

ment is sometimes used, or an elastic catheter. If the latter, a string (waxed ligature) is put through the hole at the end of the instrument, and that is oiled and very gently passed back into the nostril until it can be felt at the opening above the throat. With forceps (nippers) one end of the string is then seized and brought out of the mouth. A piece of cotton is tied upon it, and then the catheter and the other end of the string are drawn out of the nose, and the cotton plug is held firmly against the back of the nostril. If still necessary, another plug may be again inserted in the front of the nostril.

Bleeding in the Mouth.

When a tooth has been pulled, or, in an infant, the gums have been freely lanced, sometimes considerable bleeding will occur. If from a tooth, a plug of cotton may be dipped in *Creasote*, or *Tincture of Chloride of Iron*, and pressed into the bleeding cavity with the end of a bodkin or darning-needle. *Ice* may be applied to too freely bleeding gums, or they may have put against them a soft rag wet with *Alum-water* or a *solution* of *Tincture of Chloride of Iron.*

Spitting of Blood.

Is it from the *lungs*, or from the *throat*, *mouth*, or *nostrils?*

Not unfrequently, bleeding from the *nose* goes backwards, into the throat, and the blood, then hawked up, is naturally imagined to come from the lungs, sometimes causing great alarm. Inquiry and examination will make it clear whether this, or bleeding from the mouth, is the case.

Ulcerated throats sometimes bleed. The ulcer can then be seen, in a good light, if the tongue is pressed down with the handle of a tablespoon. This sort of bleeding, however, is not at all common.

When *vomiting* occurs before blood appears, we ascribe it to the stomach. The blood is then, usually, rather dark and thick; not fresh-looking.

If real *bleeding from the lungs* takes place, the blood is coughed up (perhaps quite softly and lightly); it is, as a rule, bright red. Only a little may come; sometimes merely streaking the expectoration; or it may be copious; mouthfuls all at once. In this last case, it is attended by danger of exhaustion from the loss of blood.

No unprofessional person should think of taking charge of a serious hemorrhage without the aid of a physician, if one can be had. While waiting for one, however, what ought to be done?

Put the patient upon a bed, with the head and shoulders comfortably raised with pillows. He must keep very still and not speak. Let a

piece of ice be taken into his mouth every few minutes, and swallowed slowly. Then fasten around each arm, above the elbow, a shawl-strap, if such be at hand, or a long handkerchief, quite tightly; leaving each on, however, only a few minutes at a time. If the bleeding does not stop, let them be tightened again and again, several times. Should this not succeed, and the doctor has not yet arrived, similar straps or bandages may be applied in the same manner to the lower limbs, just below the knees.

If blood comes from the *stomach*, it may be from *ulceration*, or *cancer*; or it may be *hysterical* (that is, connected with general nervous disorder), or, in exceptional cases, may take the place of menstruation which is suppressed. (*Bursting* of an *aneurism of the aorta* is a possible source of hemorrhage, either from the stomach or from the lungs; but the existence of such an aneurism will mostly have been before discovered by an attending physician.)

To moderate or check large bleeding from the stomach, as shown by free vomiting of blood, *ice* is the safest and most hopeful of remedies. Keeping quiet, and taking the least possible food in the liquid state, are important. Boiled milk with lime-water will be the most suitable nourishment; or arrow-root, tapioca, etc. In the absence of medical advice, no medicine had better be ventured upon; unless it be swallowing very small amounts of solution of *Alum*, or, once in two or three hours, a single drop of *Creasote*, dissolved in two tablespoonfuls of water.

Intestinal Bleeding.

For hemorrhage from the *bowels*, the same kind of management is applicable as that appropriate when blood is thrown up from the stomach; as just described.

Bleeding piles (hemorrhoids) are, of course, troublesome, but the bleeding, as such, does not nearly always require treatment. If it continues very freely, the patient must lie still in bed, with a piece of oil-cloth or rubber-cloth under the lower sheet. A piece of sponge or a napkin dipped in ice-water may be held against the fundament. If anything else is to be done, it ought to be upon a physician's advice.

Monthly Irregularities.

Proposing to refer again to these hereafter, under the several heads of *Amenorrhœa*, *Dysmenorrhœa*, and *Menorrhagia* (our present aim being to bring forward general principles in regard to remedies), our most important statement now is that there are no certain specific medicines which will always bring on, or always delay, or otherwise regulate menstruation.

A comparison will here be instructive. We can always make any one *vomit* with an *emetic*. We can be sure, if there be no obstruction of the bowels, of causing *purgation* by one or another of the *cathartic* medicines. Most probably, in a given case, we can, by cold drinks and diaphoretic medicines, produce *sweating*. Probably, but not certainly, *diuretics*, so called, will in given cases increase more or less the flow of urine. Farthest of all from certainty is our endeavor to act upon the *uterus* so as, when menstruation is postponed beyond its regular time, to hasten it, or, when it comes too often, to retard its coming.

For delayed monthly courses it is desirable to produce a determination of blood towards the lower part of the abdomen. Hot foot-baths, and warm hip- or sitting-baths, are the most effective means for this end. Opening the bowels rather briskly with a Lady Webster's or a Compound Rhubarb pill, or Warner's Cordial, or Tincture of Aloes and Myrrh, will also be helpful towards it. Especial care must be taken that the body, and most of all the feet, shall not be chilled at such a time.

Lately, good medical evidence makes it appear that *Permanganate of Potassium* is a good promoter of regularity in menstruation. Manganese, which it contains, is a metal, chemically a good deal like iron. Two grains may be the dose, twice daily; stopped or lessened, however, if it causes sickness of the stomach or irritation of the bowels. If it seems to agree with the patient, it may be continued through a month or two, discontinuing it at the time of the monthly return, when that takes place.

For painful menstruation (*dysmenorrhœa*), lying still is very important from the beginning of the attack. Warm flannels (wrung out of hot water, or heated dry at a fire close by), may be applied to the abdomen. A hot drink is likely to be comfortable, such as this: Put into half a teacupful of hot water, a teaspoonful of Warner's Cordial, a teaspoonful of Compound Spirit of Lavender, and twenty drops of Spirits of Camphor; stir them well together just before taking it. Should relief not come in an hour or so, Paregoric—a teaspoonful at once—may be given. Few cases will need any stronger anodyne; and they should be under the care of a physician.

Gentle compression of the womb, with a warm hand upon the abdomen, will sometimes lessen the pain. The same may be hoped for from firm and steady pressure on the two hip bones near their front edges; as mentioned in the case of colic.

Menorrhagia is excessive menstrual flow; a variety of *hemorrhage*. The most important part of its management is usually during the intervals, to prevent it. Near the expected time the sufferer, who has

reason to fear it, should lie still in bed. When the excessive flow comes, cold wet cloths may be laid upon the abdomen, the rest of the body being kept comfortably warm. Only a decidedly bad case will fail to be thus moderated. Further treatment, such as injecting hot water, or vinegar and water, into the vagina, or squeezing a cut lemon therein, or plugging with cotton soaked in alum water, etc., had best be left, whenever possible, to a physician.

Dropsy.

For our purpose, in this place, it may be said that there are three classes of dropsical troubles: **general** dropsy (*anasarca*), **superficial local** dropsy (*œdema*), and **local internal** dropsies. After scarlet fever, the kind most likely to come is *anasarca*, general dropsy. From great weakness and thinness of the blood there often comes *œdema*, or local watery swelling, of the *feet*. Heart-disease, liver-disease, or kidney-disease will often bring on *general* dropsy; but, not infrequently, liver-disease will be attended by *abdominal* dropsy (*ascites*) almost alone. *Chest* dropsy (*hydrothorax*) is another local internal form; and *water in the head* (*hydrocephalus*) another.

For the cure of any of these, the great thing is to find the cause, and remedy it, if possible. We have to mention this *if*, because, of all difficult diseases to cure, those which produce dropsy are, in many cases, among the most obstinate. It is often, though of course not always, one of the last results of disease, which itself may have continued for weeks, months, or years. The best hope of its being cured is in those cases in which there is not much else the matter, and when it has not yet lasted long.

Just for the dropsy, as a symptom, when it is right to treat that, physicians give *diuretics* and *purgatives*. Of the first may be named *Cream of Tartar*, *Juniper Berries*, and *Squills*. Cream of Tartar (Bitartrate of Potassium) acts also moderately on the bowels. Another purgative used in this way is *Jalap*, frequently given with Cream of Tartar. More active is what is called the *drastic* cathartic, *Elaterium*; which, even in very small dose, will purge severely. All these medicines, indeed the whole treatment of dropsy, ought to come under the judgment of a skilful physician. Such an one, when unsuccessful (as may happen) in reducing dropsy by diuretics and purgatives, may conclude it best to tap the patient; that is, to let out the water by introducing a small tube into the swollen part. This gives immense relief, sometimes permanent. In a certain number of instances the fluid accumulates again, and the operation may have to be repeated. Tapping the *abdomen* has long been an approved practice; doing the same for

effusion in the *chest*, after *pleurisy*, has latterly been found suitable in a considerable number of instances; and even water around the *heart* (pericardial effusion) has been so relieved in some cases within a few years.

Another relieving operation sometimes performed for great watery swelling of the legs and feet is to *lance* the skin in a good many places, so as to make the water ooze out gradually. When this is done, the parts should afterwards be greased with Cold Cream or Tallow, to prevent inflammation, which might become erysipelatous and troublesome.

One form of dropsy is peculiar to women, generally after or near middle life—*ovarian* dropsy. This is not often greatly helped by medical treatment, or even by tapping. When it is clearly going to shorten life very much, surgeons increase the probability of longer survival by an operation, *removing the tumor*, which is the cause and seat of the dropsical swelling. This operation is called *ovariotomy*.

Prostration: Debility.

We have seen already that there is more than one kind of weakness from disease. There may be **oppression**, as in the early stage of almost any acute disorder; or **depression** (prostration) from a great shock, such as a railroad accident, crushing a limb, or from the lowering influence of typhus or typhoid fever; or **exhaustion**, such as will be produced by a large hemorrhage, an attack of cholera morbus, or a severe disease of some length of continuance.

For **oppression**, in a person of good constitution and strength, **unloading** the system is needed—by sweating, purging, and action of the kidneys.

For **depression, support** is called for. Not deeming it expedient to go here into an argument about it, only mentioning that some difference of opinion has latterly sprung up on this point, my own judgment, based on experience, goes with that of physicians generally, to this effect: that **alcoholic** stimulation is, in sudden or great prostration from any cause, the most effectual. It may enable the system to tide over the time of weakness and danger, so that all will go on well again; whereas, without it, the patient may sink and die.

Alcoholic stimulation is very often abused. It is employed when there is no occasion for it, and when required it is frequently excessive in amount. Every little feeling of weakness does not properly call for a glass of wine or whisky; far from it. *Fainting* is better treated by *fresh air*, as much as possible; dashing or sprinkling *cold water* on the face, and *Ammonia*. *Smelling salts* (Carbonate of Ammonium) put, for

a moment at a time, under the nostrils, will hasten recovery from a faint (*syncope*). When swallowing is possible, twenty or thirty drops of the *Aromatic Spirit of Ammonia* may be taken in a wineglassful of water.

But when a person is almost dead from loss of blood, or an extensive burn, or the shock of a railroad accident, with white lips, shrunken cheeks, cold skin, and rapid, thready pulse, we need to stimulate with Alcohol, but not too much. A *teaspoonful* of whisky will be enough, in many instances, repeated in ten or fifteen minutes, if the patient does not show reaction. A *tablespoonful* will be a large enough dose at one draught in any case. More will do no better towards stimulation, and the after effect will be worse. Always, moreover, such stimulation must be withheld as soon as the depression has passed away, and then the less alcohol he has had put into his system the better.

General Debility.

After an acute disease with fever, as scarlet fever, measles, typhoid fever, etc., *convalescence* is accompanied by more or less debility. But when everything goes well, *appetite* is then strong, and the losses of the system are made up by the appropriation of food. A person who was healthy before such an attack will commonly need no help from medicines to "build up" again.

Running down in strength, however, with or without acute disease, and often without any fixed disorder of any great organ, is not uncommon, from various causes. Too severe, monotonous, and long-continued labor, out of proportion to one's strength; worry, particularly when it prevents refreshing sleep; living in a close air, without change and exercise; these are some of the conditions in which people are apt to get down "below par" in strength.

Poverty of blood (anæmia) is generally present in such cases. So is *loss of appetite* and digestive power; and *nervous depression*. These are the three elements of ordinary continued debility.

To meet these, we have, besides **rest from care**, **change of air**, and **generous feeding** (all of which are of the greatest importance), three sorts of **tonics**: *blood-renewers, appetizers,* and *nervines*. Of the first class, referring to works on Materia Medica for others, the most valuable, in the generality of cases, are **Iron** and **Cod-Liver Oil**. To the second class belong the *vegetable* **Bitters**, as *Gentian, Quassia, Columbo, Chamomile,* etc.; and the *Mineral Acids*, as *Aromatic Sulphuric Acid* (Elixir of Vitriol), and others. Under the third head may be named **Quinine** as most largely and safely applicable to general debility. Physicians also use, in some selected cases, *Strychnia* and *Phosphorus*, as powerful nervine tonics; but they are too dangerous to allow in the

family medicine chest for use without medical advice. One preparation, if labelled *Poison*, and kept out of the way of the children and of ignorant servants, may sometimes find safe use as a tonic both to the digestive organs and to the nervous system; *Tincture of* **Nux Vomica**; safe in the small dose of ten drops twice or thrice daily.

Remedies for Special Diseases.

We have very few real and certain *specifics* for the cure of particular diseases. The great boast of the medical profession is of its power to stop "chills and fever" and control other kinds of **malarial** attacks with **Quinine**, and with some other preparations from the same source, namely, the Peruvian Bark. **Syphilis** is, undoubtedly, curable in the large majority of cases, timely attended to, by the skilful use of two remedies, **Mercury** (various preparations) and **Iodide of Potassium. Itch** is always conquerable by a sufficient application of **Sulphur**, in ointment or otherwise.

Scurvy is curable, without much aid from medicines (tonics if any) by **fresh vegetable food**; as potatoes, onions, oranges, lemons, etc. **Inflammatory rheumatism** is beneficially influenced by **Salicylic Acid** and **Alkalies** (Potassa, Soda, Lithia); as **Gout** has been long known to be by **Colchicum.**

Besides antidotes for actual *poisons*, and medicines which kill or drive out *worms* from the bowels, we cannot claim any other clear examples of special remedies for particular diseases. It used to be said that *Iodine* is a certain cure for *goitre* (enlargement of the thyroid gland in the neck). It is no doubt generally serviceable in that affection; but it will not always cure it. Quinine does not always cure ague. It "breaks" the chills, but in one, two, or three weeks they may come again; and the cure then has to be finished by a month or two of a course of *Iron*.

There has not yet been discovered any specific remedy for scarlet fever, measles, whooping-cough, small-pox, typhoid or typhus fever, yellow fever, or cholera. All these diseases must be, therefore, conducted through the attack as safely as possible; meeting the symptoms as they occur, with the most reasonable measures we know of. I have sometimes told medical students, when talking of this subject, of what once happened to my father, while he was practising medicine.

Having to drive several miles out of town to make an early visit to a patient, his horse was put into the carriage without any breakfast. On the way home, on a turnpike, the animal's hunger, and perhaps wrath, caused him to run away. My father, being alone, was quite unable to check his speed. As he dashed on, a turnpike gate came in view. What

was to be done? Stopping the beast was impossible. Had the reins been abandoned, although the gate was open, going through at full speed, not guided, would probably have resulted in knocking carriage, turnpike gate, and doctor all together into *pi*, as the printers call it. Therefore the doctor, being a man of good steady nerves, held the reins carefully, and *drove through the gate*, without even grazing a hub! After that, the runaway used up his excess of animal spirits without serious harm to anybody. So it is, then, that, in the **self-limited** diseases, above mentioned, we are to *drive through*, as skilfully and carefully as we can, attacks which we cannot abruptly stop; but which will come to an end of themselves after a while.

Worms, Poisons, Accidents, and **Injuries** will have their special consideration in suitable places later in this book.

PRINCIPAL MEDICINES, AND OTHER REMEDIES.

For the reader's convenience, we will now give a brief account of each medicine that has been spoken of in the preceding, or is likely to be particularly mentioned in the following, pages. As they are alphabetically arranged, there will be no difficulty in finding any one of them for reference.

Acetate of Ammonium Solution. This is a mild, moderately cooling medicine, very suitable to **promote perspiration** during fever. It is easily made by dropping small pieces of *Carbonate of Ammonium* into good *Vinegar*, piece after piece, until it ceases to bubble with effervescence. (This proceeds from the Carbonic Acid gas passing off, being displaced by the Acetic Acid of the Vinegar.)

Dose of this Solution, a Tablespoonful every two or three hours. It is preferred to other sweating medicines especially in *typhoid* and *typhus* fevers; *low* fevers, so-called. It does not act upon the bowels.

Aconite. Tincture of the Root of the Monkshood or Aconite plant. A deadly **sedative** poison in any but very small dose. It acts mainly on the nervous system, but indirectly on the circulation. Some physicians use it in many cases of *inflammatory fever*, as in that of pneumonia, pleurisy, etc. *Dose*, one or two drops, in water, for a grown person, every two, three, or four hours. A bottle containing it should be labelled **Poison.**

Aloes. A powerful **purgative** medicine, having a particular tendency to act on the *lower* bowel. Therefore it is not a suitable cathartic in cases of *Piles*. Yet, in a very small, not purgative, dose, it is sometimes added to other medicines for the relief of piles. Its action on the lower bowel makes it more appropriate when *delay* of the feminine *monthly flow* is treated by laxative medicines. The *Tincture of Aloes and Myrrh* (Elixir Proprictatis) has been much employed for this end. *Dose* of *Aloes*, from one or two to ten or more grains. *Dose* of *Tincture of Aloes and Myrrh*, from one to three or four teaspoonfuls, in water.

Alum. A mineral, called a *salt* by chemists. It contains either *Ammonium* or *Potassium* with *Aluminium* and *Sulphuric acid* in combination. (There is also an *Iron* Alum, in which, likewise, Ammonium is present.) It is crystalline, and has a peculiar taste, easily recognized after making its acquaintance. Alum is not often given as a medicine by the stomach, except as an **emetic** in *bad* cases of *croup*. For that purpose, its *dose*, in powder, is half a teaspoonful, with the same amount

of the powder, or a teaspoonful of Syrup of Ipecacuanha. In small dose, it is an **astringent**; that is, it tends to make the tissues which it touches shrink or contract together. Thus it helps to lessen the swelling of the mucous membrane, which is inflamed in *sore throat*, and it is much used for that, either in *powder* or in solution as a gargle. The powder may be *blown* into the throat through a quill, or, sometimes, *put* on the sore place with the end of one's finger. A *gargle* is made by dissolving a piece as large as a thumb in half a tumblerful of water. It is used by taking a mouthful of it and throwing the head back *without swallowing it*, letting it go as far down into the throat as it can without being swallowed.

Alum should not be employed in *mouth*-washes, because, when left long in contact with the teeth, the Sulphuric Acid in it acts somewhat upon their enamel. A solution of alum in pure water makes a good astringent eye-water, for inflammation of the eyes: an even teaspoonful of alum in a tumblerful of water will be strong enough.

Ammonia. *Volatile Alkali* and *Hartshorn* are other names for this substance. When pure, it is a gas; but it is used either in the form of the Solid Carbonate of Ammonium, or in solution in Water (Aqua Ammoniæ), or in Alcohol. Smelling salts consist usually of the Carbonate. Druggists keep a stronger and a weaker watery solution of Ammonia. The medicinal form most used is the *Aromatic Spirit of Ammonia* (a solution in Alcohol, with Spices). This is a **stimulant** and **antacid** preparation. Its *dose* is from ten to twenty-five or thirty drops, in water. *Aqua Ammoniæ* (Water of Ammonia) is used to make *Volatile Liniment*, by mixing it with an equal quantity of Olive or Lard Oil. This liniment is a very **warming** thing to rub into the skin of the throat for a sore throat, as a **counterirritant.**

Amyl Nitrite. See **Nitrite of Amyl.**

Anise-seed is a mild **aromatic** or spicy article, warming and agreeable to the stomach. It is hardly ever used by itself, but is employed sometimes to flavor medicines. It gives the peculiar odor and taste to Paregoric.

Apollinaris Water is an effervescing "mineral-water," having no marked property or action beyond that of the Carbonic Acid gas which makes it sparkling and pungent to the taste. Travellers in Europe often take it at their meals, so as to avoid the usual drinking-water at doubtful places. In this country, also, it is getting to be a popular table-water. (St. John's champagne!)

Arnica. The *Tincture* of the flowers (or of the whole plant) is a popular application for bruises and sprains. It is a **warming** application, and not suitable where the skin is broken. Being poisonous when

swallowed in large doses, it should be kept so labelled, and so used as to prevent mistakes with it.

Arsenic. A metal whose compounds are poisonous. *Ratsbane* is the White Oxide of Arsenic (Arsenious Acid). *Paris Green,* a good exterminator of potato-bugs, is an Arsenical preparation, with Copper. The medicinal form in which Arsenic is generally prescribed by physicians is the Solution of Arsenite of Potassium (Fowler's Solution). *Dose,* from three to ten drops, twice daily; often given for chronic diseases of the skin. It should never be taken by an unprofessional person, without medical advice.

Artificial Respiration. See *Drowning,* later, under **Accidents and Injuries.**

Assafœtida. A gum-resin, of very disagreeable odor and taste; a good, mild, and safe **composing** medicine for disturbed nerves. Assafœtida pills, of three grains each, may be given now and then to hysterical people. This drug is also good for *flatulence. Milk* of Assafœtida is a very serviceable medicine for *babies' colic. Dose,* a teaspoonful, sweetened.

Atomization. See INHALATIONS.

Bark, Peruvian. See **Cinchona** and **Quinine.**

Baths. Enough has been said under **Hygiene** concerning bathing during health.

In treatment of disease, the kinds of baths most used are the **warm** and the **hot** bath. We may call it warm from 90° to 96° Fahr., and hot from 96° to 100°. It never need be hotter than this last figure.

Warm baths are very often useful, for relaxing and tranquillizing the system. In *croup, convulsions*, and *lockjaw*, as examples, such effects are often well obtained.

Hot baths, though less frequently called for, are sometimes very serviceable; especially in cold and low states of the system. Chronic rheumatism is one of the affections likely to be benefited by it.

Hot Dry Air Baths (Russian bath) are occasionally advised by physicians, in obstinate prolonged skin affections, etc.

Vapor or *steam* baths are occasionally used for the application of heat and moisture to the body. They are not safe beyond the temperature of 110°, or possibly, for a short time, 120°. Moisture conveys heat to the body much more rapidly than dry air at the same temperature. A steam bath may be given, by the patient being stripped of clothing, and seated in a chair, wrapped, chair and all, in a blanket; his head only projecting above the latter. Then vapor may be generated by dropping very hot bricks into a pail of water placed between his feet. As above said, care must be taken about the temperature; and, on the whole, it will be hardly best to resort to a vapor bath without the advice of a physician.

Hot and **Warm Springs,** as those of Virginia, are medicated by the sulphurous and other contents of the waters. Sometimes they do much good (bathing in the waters) for chronic troubles of the liver, kidneys, etc., and rheumatic joints.

Belladonna. This product of the *Deadly Nightshade* (Atropa Belladonna) is a powerful **narcotic** or brain stimulant drug. The *Extract* of the leaves is most used by physicians as a medicine, in neuralgia, etc. *Atropia*, a very strong alkaloid principle, is obtained from the root. Its solution is often dropped into the eyes by oculists, for the examination and treatment of affections of the eyes. It enlarges or dilates the pupils, giving them a more brilliant appearance. Ladies are said to take it sometimes before going into company, to make their eyes "brighter"; whence the name, from *bella donna, fair lady.*

Dose of the solid Extract, a quarter of a Grain to a Grain; of the Tincture, ten to fifteen drops. *Solution of Atropia* for the eyes, two to four grains to a Fluidounce of water. Neither should be used without medical advice.

Benzoin. A resinous substance, from the *Styrax*, an East Indian tree. The Compound Tincture of Benzoin is a good medicine for bronchial cough. Dose, fifteen to twenty drops, on a lump of sugar, every three or four hours; or at the beginning of a spell of coughing. The same Tincture, applied with a camel's-hair pencil, is very healing to a *sore nipple* or a *cracked lip*, or even a *fissure of the anus.*

Bismuth Subnitrate. A soothing stomachic medicine. Dose, 2 to 5 grains.

Blackberry Root. Country people generally know the **astringent** property of this; but some make a mistake in supposing the *berries* to have the same; which they do not. A tea made by cutting up a handful of the root and soaking it for two or three hours in boiling water (kept hot) will answer a good purpose in checking diarrhœa, in tablespoonful doses.

Bleeding. An opinion concerning the occasional usefulness of this old-fashioned remedy having been expressed on a previous page, we have now only to say a few words about how it is done; although few people will want to try it before they have seen it done.

At the bend of the arm is the most convenient place for *venesection* (opening a vein); choosing a cross vein if there is one, as is generally the case. First, tie a bandage or handkerchief around the arm, above the elbow; not as tight as it could be, as that would stop the flow of blood into the arm through the artery. What we want is to check the return flow of blood towards the heart, in the veins, so that they may swell up and be easily seen and struck, and will then let out a good stream of blood. Of course the sleeve must be put out of the way for the operation. When the chosen vein becomes distended, it is opened by means of a lancet. There are two kinds of bleeding lancets. One is a simple small blade, tapering to a sharp point, which is dipped, so to speak, through the coat of the vein, nearly in the line of its direction. The other is a *spring* lancet; the small pointed blade going forcibly into the vein when a button at the side of its case is pressed upon. Either will answer. When the opening is made in the vein, the blood, commonly dark-blue or purple, spurts a little, and then flows in a steady stream. If there is high fever, its color may be bright red, like that of arterial blood. Now and then, if the vein cut be just over an artery, the pulsation of the latter may make the blood come in an interrupted jet, as if from a wounded artery. Unskilful bleeders have sometimes opened an artery along with the vein, an accident which may give serious after-trouble. (If it should happen, pressure on the wounded artery, at and above the wound, will be required to stop its bleeding.)

When enough blood has been taken, which may always be known to be the case if the patient becomes pale and faint from it, the bandage

should be removed. This alone will usually stop the bleeding at once. If not, pressure with a thumb or finger on the vein just below the cut, will certainly control it. Ten ounces will be a sufficient bleeding for most grown persons; much less of course for a child. The effect, however, is the best guide. No patient is to be drained of blood; we need merely to reduce *excitement* or remove *oppression*. In *inflammation* of the brain, lungs, larynx (as in severe croup), pleura, or peritoneum, the former is desirable. In congestive apoplexy, or poisoning from breathing coal or burning gas, the latter is the mode of relief.

Leeching and cupping will have most of the good effects of bleeding from the arm; and in doubtful cases may be substituted for it.

Blisters. We use *Mustard-Plasters* not to blister, but only strongly to warm and stimulate the skin. For raising a blister, *Cantharides* is mostly resorted to. The oldest way is to spread the *Ointment of Cantharides* on a piece of buckskin, three or four or five inches square; cover this with a piece of gauze, and lay it on the part. This will draw a blister upon a grown person in four, five, or six hours; with a child, in two hours or less. Then nip (do not remove) the raised scarf-skin with the point of a pair of scissors, and lay upon it a soft muslin rag thickly spread with Simple Cerate, as a healing dressing.

Cantharidal Collodion is a strong liquid preparation, which, when painted on a part with a small brush (camel's-hair pencil), and covered with oiled silk or rubber cloth, will draw a blister in from an hour and a half to three hours generally.

Blisters are unpleasant things, but are sometimes very beneficial; especially at the *middle stage* of a serious inflammation, as of the brain, pleura, lungs, etc. In severe inflammation of the brain in a man, I have known great advantage to follow shaving the head and blistering nearly the whole head at once.

Once in a while *strangury* (difficulty in passing water) will follow the application of a blister, from some of the Cantharides being absorbed into the blood, and so getting through the kidneys into the bladder. Flannel wrung out of hot water applied to the *bladder* and *perineum* (crotch, just between the thighs at the pelvis); Spirits of Camphor, taken in twenty-drop doses; and, if the difficulty lingers, a Laudanum injection into the bowels, are remedies for strangury.

Blue Pill, or Blue Mass. This is a preparation of Mercury, one-third of the strength of Calomel. It is a soft solid, easily made into pills. Apothecaries usually keep on hand three-grain Blue Pills.

Much discussion and some change of opinion have taken place in the medical profession within twenty-five years about the use of Blue Mass and other Mercurial medicines. Their power over the liver has been

disputed, and their control of inflammatory attacks is not confided in now as it formerly was. The doses of mercurials also have come to be much reduced. The late Dr. Joseph Hartshorne was one of the first to observe the necessity for this reduction. He gave two- and three-grain doses of Blue Pill, when many practitioners gave ten and twenty grains.

The best established usefulness of Blue Mass is in the relief of what is called "biliousness," when there is a bitter taste in the mouth, especially on awaking in the morning; with some degree of nausea (sick feeling at the stomach), and more or less yellowness of the tongue and of the whites of the eyes; perhaps of the face or the skin generally; the bowels also being constipated, or the stools slate-colored instead of brown or yellowish-brown, as is natural. One or two grains of Blue Pill at bedtime, and the same again in the morning or the next evening, taking in all from two to four grains, will do well, without any risk of salivation, at least in all but one case or so in a thousand.

Calomel is better for a similar purpose as a baby's medicine. Indigestion and commencing diarrhœa in infants are often much helped by small doses of Calomel; powders, each of which contains one-twelfth of a grain of the medicine, with a grain or two of Soda (Sodium Bicarbonate) or Magnesia, or only Sugar; the last for taste, and to give substance to the small dose of the drug.

Borax. A very familiar article this is, in the nursery, for *sore mouth*. It is a mineral **astringent**, milder than Alum, and may be used more freely; either dissolved in water as a wash, or in powder with Sugar, put with the finger right on the sore spot in the mouth.

Bromide of Potassium, Bromide of Sodium, and **Bromide of Lithium.** These "Bromides" are nervous sedatives; tranquillizing an excited brain in a different way from Opium; having less sleep-compelling power than it. Bromide of Potassium is largely prescribed by physicians for epilepsy and some less serious but obstinate troubles of the nervous system. Bromide of Sodium has the same sort of effect, but perhaps is more agreeable to the stomach; and the same is true of Bromide of Lithium. Bromide of Ammonium is less often used for similar effects. *Bromo-caffeine* often helps nervous headaches.

Dose, of either, five to fifteen or twenty grains, in water. The largest doses are best borne when taken at bedtime. Long use of large doses of either of the Bromides sometimes causes an eruption on the skin, and some other unpleasant symptoms, called *bromism*, by physicians. For any one who suffers greatly from the sting of a bee, or other insect, twenty-grain doses of Bromide of Potassium may be advised.

Cajuput Oil. An **aromatic** greenish (or, when old, reddish) oil, from the leaves of an East Indian tree; one of the best remedies for *flatulent colic,* especially when "gouty;" and also for *flying gout* and *chronic rheumatism.*

Dose, from four to ten Drops, on a lump of sugar, followed by a drink of water.

Calomel. Chloride of Mercury. See above, under **Blue Pill.** Calomel is a white powder. *Dose,* from one-twelfth of a grain, for an infant, to one-half grain, one grain, or sometimes possibly more, for an adult. *Not to be used as a domestic medicine;* unless, after experience, the very small calomel powders, for indigestion of infants.

Camphor. A most useful *gum,* from an evergreen tree native to the south and east of Asia. Every one knows its white or colorless transparency, its peculiar odor, and pungent and yet cooling taste. It is volatile; that is, if left in the air it will slowly go off in vapor. Very little of it will dissolve in water. *Camphor-water* is a very mild preparation. *Spirit of Camphor,* made with Alcohol, is much stronger.

Camphor is a **composing** medicine to the nerves; somewhat more **stimulant** than Assafœtida. In very large doses it is narcotic (stupefying).

Camphor-water is an excellent tranquillizer for restless babies; being also, like the spices, **warming** to the stomach, and somewhat **anodyne,** it is excellent in colic. *Spirit* of Camphor is best when an anodyne effect is specially needed; as in colic of grown people.

Fig. 183.

CANTHARIS VITTATA. CANTHARIS VESICATORIA.

Dose of Camphor-water, from a teaspoonful (an infant dose) to a tablespoonful. Of *Spirit of Camphor,* from ten to thirty Drops; on sugar, and stirred in water, or in a thick syrup, as Spiced Syrup of Rhubarb. When dropped into water, the Alcohol unites with the water and "throws down" the Camphor in little white flakes.

Paregoric is a Camphorated Tincture of Opium.

Cantharides. Powdered "Spanish Flies." These are insects; really *beetles,* not flies. They are rather pretty, having shining green backs; and are native to the south of Europe. From their powder **Blistering Ointment** (Cantharidal Cerate) is made. See **Blisters.**

Carbolic Acid. This (also called *Phenic* and *Phenylic* Acid, and *Phenol*) is a product of coal-tar, as Creasote is of wood-tar. It is not really an acid, chemically, though so called. When pure, and entirely dry, it is in nearly colorless crystals; but it easily absorbs water and becomes liquid (deliquesces) when exposed to the air. Crude, impure Carbolic Acid has a brownish color. Its odor is disagreeable; its taste hot, followed by tingling and perhaps numbness of the tongue. It

FIG. 184.

PALMA CHRISTI.

burns, like Creasote, when dropped upon the skin; but this is immediately followed by loss of feeling in the part.

Carbolic Acid has no proper place as a domestic medicine. It has had great popularity as a **disinfectant**; more than it deserves, in comparison with several other less unpleasant things. Surgeons often employ it in "antiseptic" dressings and lotions.

Cardamom Seeds, *Compound Tincture of.* A warming aromatic preparation, often added to Soda, etc., for sickness of the stomach. *Dose*, a Teaspoonful, in Water.

Castor-Oil. Expressed from the beans or seeds of the *Palma Christi*, a handsome plant, originally from Asia. It is nasty, decidedly; but is a good, effective, and yet mild **purgative** medicine. It is the best cathartic, even for babies, when any *irritation of the bowels* is present; as in threatening of dysentery, and in some cases of colic.

Dose, from a Teaspoonful to a Tablespoonful. The best way to give it is to stir it well with twice the quantity of *Spiced Syrup of Rhubarb*. So mixed, I have had patients to take it without finding out what it was.

Catechu. An Extract from the wood of an Oriental tree. It is **astringent**, and is very useful in *diarrhœa*. *Tincture* of Catechu is the best preparation. *Dose*, Half a Teaspoonful to a Teaspoonful, in water. An excellent medicine to check troublesome diarrhœa consists of equal parts of *Tincture of Catechu and Paregoric;* of this mixture, the dose is a Teaspoonful, repeated according to the urgency of the case.

Cathartic Pills (Compound). These are made of three strong **purgative** medicines, with a little Calomel. They are too active to be used for ordinary constipation of the bowels; but are very convenient when a decided purgation is needed.

Catheter. A tubular instrument for drawing the urine from the bladder, when the patient cannot pass it. The one for the male is long and curved; that for the female, short, and with only a slight bend near the end. It is made either of silver or of prepared gum-elastic; the latter being flexible, the former firm. Both are open at one end, and closed at the other, which is rounded and smooth; but just above the closed end (which is introduced into the bladder) are several holes, to admit the water. Skill and care are needed for the use of the catheter. The difficulty is greatest with the male. Of course the instrument must be well oiled before being introduced.

Caustics. Several of these are used by physicians. We may name here a few of them. **Lunar** Caustic is Nitrate of Silver. It is less destructive than the **Vegetable** Caustic (so-called) **Potassa.** Strong **Acids** are caustic; as **Nitric** and **Chronic** Acids. All of these, when moistened, will burn the skin, or any other portion of the body. Lunar Caustic, if very lightly touched upon a part, will not exactly burn it, but will **change** the **condition** of the surface in a way often beneficial, especially in *chronic inflammations;* also, in **destroying** the **specific** character of an inflammation, as of the throat in diphtheria or in scarlet fever.

Warts are often destroyed by the stronger caustics. Care must be used to act only on the wart, and not on the parts around it. If any of the caustic runs over, it should be at once washed away; best, with

an antidote to it in solution. For Potassa, Vinegar is an opposite or antidote; for either of the Acids, Soda.

Cerate. This word means something made with wax. **Simple** Cerate is made of Spermaceti, White Wax, and Oil of Almonds. It is a very soothing and healing application to sore places of any kind, as after a blister, etc. It is harder than Cold Cream (Ointment of Rose Water), and this is sometimes a decided advantage.

Chalk Mixture. A convenient medicine for common diarrhœa, made of Prepared Chalk, Gum-Arabic, Glycerin, and Cinnamon Water. *Dose*, a Tablespoonful for a grown person. Most frequently something is added to make it more "binding" or astringent, as Catechu, Paregoric, etc.

Chamomile. This is a plant (Anthemis nobilis), a native of Europe, but naturalized in parts of this country. The flowers are bitter and aromatic. Of these a tea is made with boiling water. It may be taken, half a pint daily, as a simple appetizer and tonic in weak digestion or general want of strength. It is not, however, one of the strongest tonics.

Charcoal. Powdered charcoal is a good "sweetener" of a stomach oppressed with flatulence from indigestion. Dose, half a teaspoonful to a teaspoonful. It is often given with an equal quantity of Magnesia.

Very finely powdered charcoal is also a useful ingredient in *tooth-powders;* on account of its cleansing action.

Chloral (*Chloral Hydrate*). One of the medicines that promote sleep. It is less powerful than Opium, although a very large amount of it taken will poison fatally. It gets its name from its being made from *Chlorine* and *Alcohol.* It is a white crystalline substance, of a pungent taste and odor.

Dose, from ten to thirty Grains for an adult; for a child, one Grain for each year of its age. It should be taken or given only as prescribed by a physician; and when so advised, left off as soon as his judgment will allow. The same sort of danger attends its use as does that of Opium, of forming a *Chloral habit*, depending upon it for sleep, and requiring larger and larger doses, with at last great injury to the health.

Chloramine pastilles. Contain Chloride of Ammonium, &c. Useful in loosening cough.

Chlorate of Potassium (Chlorate of Potash, commonly called). A favorite medicine with physicians and others, for *sore mouth* and *sore throat.* It often does more good to sore mouths, in babies especially, than anything else. But it must not be swallowed without limitation. While safe in doses of a few grains, half-ounce doses of it are dangerous; sometimes even producing death.

Dose, for a grown person, from ten to twenty Grains; for a child, three

or four years old, five Grains; dissolved in water. Its solution also makes a very good gargle for sore throat.

Chloride of Ammonium (Muriate of Ammonia, old name); sometimes also called *Sal Ammoniac.* A medicine of value in a variety of cases; in *chronic bronchial cough;* in *torpor of the liver;* and in some cases of *neuralgia.* Not well adapted, however, for use without some medical knowledge and experience. Dose, ten to twenty grains.

Chloride of Lime. *Chlorinated Lime* is a more correct name for this white powdery substance. It is used as a **disinfectant**, chiefly on account of the free *chlorine gas* which it contains when fresh, and gives off slowly into the air. While it does, no doubt, something towards destroying foulness in the air of a place, when laid about in saucers, etc., this must not be considered as amounting to very much. It requires a great deal of Chlorine to really disinfect a room or building in which there has been contagious disease, or accumulated foulness. Chlorinated Lime dissolved in water is an excellent disinfectant of privies, etc. An objection to its being so used in water-closets and bath-pipes is, that the Chlorine it contains corrodes lead and iron.

Chloroform. The most prompt and powerful, but also least safe, of the articles used by surgeons as **anæsthetics**; that is, for patients to breathe before and during operations, in order to prevent them from suffering pain. It may be taken into the stomach in larger quantity than by the lungs, without danger. In flatulent colic, it is often very relieving; but no more so than Camphor and Cuajuput, as well as Opium. *Dose,* by the mouth, ten to forty or fifty Drops; in a large draught of water, as it is very pungent. A teaspoonful holds more than 200 drops of Chloroform.

I have given it to a number of patients in teaspoonful doses, without any bad effect; only sleepiness, like that produced by opiates. A *Chloroform Liniment* may be safely used as an outward application for rheumatic or neuralgic pains.

Cinchonia. One of the alkaloids of *Peruvian Bark.* See **Quinine.**

Chlorohydric Acid. The name preferred by chemists for what was formerly called *Muriatic Acid.* It is not often given as a medicine; but is present in *Nitro-Chlorohydric* or *Nitro-Muriatic* Acid, a good appetizer and liver-tonic.

Cinnamon Water. Made from the aromatic bark of the Cinnamon-tree of the East. It is a pleasant spicy solution, slightly astringent; good with other things in mixtures for *diarrhœa.* Dose, for a child, a Teaspoonful.

Citrate of Magnesium. Commonly taken in effervescent solution. It is about the least disagreeable of all **purgative** medicines. Apoth-

caries mostly keep it already dissolved, in tightly corked and wired bottles. More convenient for keeping in a family is the solid *Granular* Citrate of Magnesium; which is to be dissolved when taken. *Dose*, of the bottled solution, a Wineglassful (more, or less, according to the amount of purging needed). Of the Granular Citrate, from a Teaspoonful to a Tablespoonful. In the latter dose, it is quite an active cathartic; although not so rapid in its operation as some other medicines; and all persons are not alike susceptible to its action.

Citrate of Potassium. Like the Citrate just mentioned, this has for one ingredient *Citric Acid*, obtained from Lemon or Lime Juice. This is neutralized by Potassium (an alkaline metal) as it may be also by Magnesium; in each case making what chemists call a *salt*.

Citrate of Potassium acts very slightly, if at all, on the bowels. It is used in solution to cool the system and promote secretion from the skin and kidneys **in fever.** One way of taking it is in Neutral Mixture (one Drachm of this citrate in four Fluidounces of water); of which the dose is a Tablespoonful every two or three hours. Another way is in effervescent solution. (See **Effervescing Draught.**)

Cloves, Oil of. A strong, warming **aromatic,** from the flower-buds of the Caryophyllus Aromaticus of the East Indies. A hot *tea* is sometimes made of Cloves, to be given in cholera-morbus.

If the *Oil* should be taken, for colic, its *dose* would be not more than a drop or two, on a lump of sugar, followed by a drink of cold water. The *tea* may be made by pouring a Teacupful of boiling water on Half a Teaspoonful of Cloves, covering and leaving it to stand for a few minutes. *Dose*, a Dessertspoonful (two teaspoonfuls, or Half a Tablespoonful).

Oil of Cloves is a good remedy for *toothache* in a hollow tooth. Wet a pledget of cotton well with it, and push it into the cavity of the tooth with the end of a bodkin or knitting-needle.

Cocoa Butter. *Cacao* is the botanical name of the tree (Theobroma Cacao) from which this comes; out of the same nuts or seeds of which Cocoa and Chocolate are made. Cocoa Butter is a good soothing application for *bruises* of any part of the body. It is well always to have it in the house.

Cod-Liver Oil. Obtained, as its name indicates, from the livers of codfish. It is very nourishing and fattening to wasted and wasting bodies, sometimes checking the progress even of pulmonary consumption. Its taste is quite disagreeable. *Dose*, from a Teaspoonful to a Tablespoonful (the latter best) thrice daily, for a grown person. Many ways have been tried to make it less unpleasant to take; following it with strong Mint-Drops, mixing it in Coffee, rinsing the mouth first with Brandy or Whisky, pouring it into the froth of Ale, etc. I doubt

whether any way (unless it is put up in *gelatin capsules*, as some apothecaries do it) is better than to *salt and pepper* it, as if it was (!) a fishy delicacy, and then bolt it down; afterwards rinsing the mouth with Tincture of Myrrh and Water. Children generally do not mind taking it, unless their fears have been aroused by talking about it.

Colchicum. A bulbous (cormous) plant, whose root and seeds are both used medicinally. The *Wine of the Root* is the best preparation. In large dose it acts on the bowels; sometimes irritating the stomach also. It is a diuretic, and influences the nervous system in a way not very well defined. It was formerly the favorite medicine in *gout;* and probably does as much as any medicine towards curing or mitigating gouty attacks. *Dose* of the Wine of the Root of Colchicum, ten to thirty Drops, in water.

FIG. 185.

COLCHICUM.

Cold Cream. This is the *Unguentum Aquæ Rosæ* (Ointment of Rose-water) of the apothecaries. It is a soft, easily melted, and very soothing application for sore places, chapped hands or lips, etc. It becomes rancid when long kept exposed to the air.

Collodion. This is a solution of Gun-Cotton (*Pyroxylon* or *Colloxylon*) in Ether. When it is painted upon any surface the Ether evaporates, leaving a thin cottony film. *Flexible* Collodion, made a little differently, is less apt to shrink together in drying. It is a convenient article to cover a part whose skin is broken or ulcerated, as *sore nipples, cracked lips,* etc.

Cantharidal Collodion has been mentioned already, as a blistering liquid.

Columbo (*Calumba,* root of an African plant) is one of the simple **vegetable bitters.** Like the rest of its class, it is a tonic to the stomach. It is given sometimes for dyspepsia.

Convallaria. See **Lily** of the **Valley.**

Corrosive Sublimate. *Bichloride of Mercury* this is, or Mercuric Chloride. *Calomel* is the Mild *Chloride,* or *Mercurous Chloride* of Mercury. The Sublimate is a deadly poison, used often to kill bugs, etc. Physicians sometimes prescribe it in very small doses (one-twelfth to one-eighth of a grain) internally, and of late a Solution of it (one part

to 1000 or 2000 of Water) is a good deal employed externally as a purifier and to destroy supposed disease-germs. It is certainly one of the most powerful disinfectants.

Coxe's Hive Syrup. A medicine not suitable for family use, though once so employed, because it contains *Tartar Emetic,* a violently-acting medicine, not safe except in skilful hands. "Hives" is an old name for croup. No doubt this Syrup may relieve cases of croup, but the same kind of effect may be usually obtained with *Ipecacuanha,* which is milder and quite safe. An overdose of Tartar Emetic (Tartrate of Antimony and Potassium) may kill an infant; not so with Ipecac.; it is just vomited and purged away without damage.

Cream of Tartar (Bitartrate of Potassium). This is a cooling, mild **purgative** salt, which also increases the flow of urine (**diuretic**). It is very often given in *dropsy. Dose,* one or two Teaspoonfuls, stirred in water. Very little of it will dissolve.

Creasote. A product of Tar. A hot-tasting, sooty-smelling liquid; poisonous if swallowed in moderately large quantity; burning the mouth or skin which it touches. Physicians advise it in one-drop doses for sick stomach, ulcer of the stomach, etc.

In domestic practice it should be on hand as the most effective remedy for *toothache* in a hollow tooth. The end of a bodkin or knitting-needle should be wrapped around with a little piece of cotton, and this be dipped into Creasote. Then, carefully, the cotton should be pressed into the hollow of the aching tooth. (It won't hurt, as it at once kills the sensibility of the exposed nerve-end in the tooth.) If any spills over and burns the gums or lips, rinse at once with cold water. Creasote, so used, does no harm to the teeth.

Croton Oil. Taken from the seeds of an East Indian plant, this is one of the most violent of **purgative** medicines; a single drop will act like a large dose of salts. It is only used by physicians in rare cases, when other cathartics fail to act, or where it is impossible to get the patient to swallow anything in larger quantity.

On the *skin,* Croton Oil, when rubbed in (a drop or two only), will cause a sore pimply or pustular *eruption.* It is thus used sometimes as a powerful **counter-irritant** in chronic spinal troubles, chronic bronchitis, etc. It is very important not to get any of it rubbed into one's *eyes.*

Cupping. See **Bleeding**; and also, **Taking Blood**, page 535.

Digitalis. *Foxglove* is the common name of the pretty plant whose leaves furnish this medicine. The *Tincture* is most used. Physicians give it often when the action of the **heart** is **too rapid,** and perhaps irregular. It has also been given in large doses in *delirium tremens.* Its common dose is ten Drops, twice or thrice a day. Being **diuretic,** it is sometimes prescribed in *dropsy.* Its very powerful active principle is *Digitalin.* Of this, if taken as a medicine, the *dose* is one-fiftieth of a Grain.

Fig. 186.

DIGITALIS PURPUREA.

Dover's Powder. Made of *Ipecacuanha, Opium,* and a cooling salt (Sulphate of Potassium, or some similar compound), this medicine is **composing** and **diaphoretic.** Some persons find it agree with them at the beginning of a severe cold, taking it just before going to bed, after a warm mustard foot-bath. *Dose,* ten Grains; containing one Grain of Opium and one Grain of Ipecacuanha. As this is a full regular dose of Opium, it needs to be slept, as well as sweated, off. Better not take Dover's Powder without the advice of a physician; at least the first time.

Effervescing Draught. This is a cooling medicine for fever; the Carbonic Acid gas in it also makes it acceptable to the stomach. It is composed on the following recipe:

Dissolve two Drachms and a half of Bicarbonate of Potassium in four Fluidounces of Water. To make a draught, pour out a Tablespoonful of this solution, and add to it a Tablespoonful of Water. Then pour into these a Tablespoonful of fresh Lemon-juice. It will effervesce, and should be drunk at once. If Lemon-juice cannot be had, an apothecary may furnish instead a solution containing two Drachms of Citric Acid in four Fluidounces of Water. A tablespoonful of this, with one of water, may take the place of Lemon-juice.

Elaterium. A substance from the juice of the *Squirting Cucumber*, so called from the way in which the pod of the plant throws out its seeds when ripe. It resembles Croton Oil in being a harsh and powerful **purgative**, causing copious watery passages. It is seldom used by physicians except in certain cases of dropsy.

Electricity. Physicians often advise (or themselves personally apply) different forms of electricity for the treatment especially of *paralysis;* also, for *neuralgia*, *chronic rheumatism*, *old sprains*, *suppressed menstruation*, *lead colic*, and many other affections. Powerful currents or shocks are frequently used to revive persons almost dead from *drowning*, *suffocation*, or *narcotic poisoning.*

Referring to medical works* for a more extended account, the general principles only can be here considered. Three kinds of electricity are used: **frictional**, of the machine of glass with a rubber; **voltaic** (galvanic), the current obtained from a "battery," composed of metals with acid solutions, etc.; and **faradization**, by "induced" and interrupted currents, electro-magnetic or magneto-electric.

The **constant** current produced by chemical action, in a battery or by the simpler arrangement of a "pile," of pieces of metal with a material between them moistened with acid, is the more penetrating of these methods; in chronic cases needing perseverance in alterative treatment. The **interrupted** current is most used to stimulate weak muscles and nerves, as in paralysis. It is the general opinion of physicians, that electricity is not likely to do good at an early stage of palsy, or while there is anything at all *inflammatory* about the attack which causes it.

For domestic use, when recommended by a physician, the most convenient apparatus is the *magneto-electric* arrangement. In this, as com-

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*See "Essentials of Practical Medicine," fifth edition, p. 171, for a brief summary on this subject.

monly made, the interrupted current is generated by a "keeper" (a small piece of iron) revolving, when a handle is turned, so as alternately to approach and recede from a magnet. A very strong and rapidly successive series of shocks may thus be produced, controlled, however, by the sliding in or out, at will, of a rod provided for the purpose. In order to take effect upon any part, a "circuit" must be made, by each "pole" of the apparatus being brought in contact with the body (that is, both at once). For this handles are arranged, usually with soft sponges at the ends, to be moistened when applied.

Too strong currents or shocks of electricity may do considerable harm. The application should never be allowed to be painful or distressing, or be continued so long as to produce positive fatigue or exhaustion.

Various patent contrivances are sold to maintain constant currents of electricity when they are worn about the person. While it is not impossible for an appreciable current thus to be kept up for some time, it is seldom the case that such instruments act otherwise than through the imagination. That faculty, however, is very powerful in its influence upon the bodily conditions of many people. Perhaps it ought even to have a section among remedies by itself.

Elixir of Vitriol. *Aromatic Sulphuric Acid* is another name for this, which is often prescribed as an appetizer; sometimes also for diarrhœa, and occasionally for *hemorrhages*. *Dose*, ten to fifteen drops, in water; best taken through a glass tube, to prevent its touching the teeth; also, for the same reason, washing the mouth out well with water after it.

Elixir Proprietatis (*Elixir Pro*). This is an old name for *Tincture of Aloes and Myrrh;* which has a popular reputation as a medicine to bring on the monthly courses when delayed or suppressed. *Dose*, a teaspoonful, in water, twice daily.

Emetics. Articles which cause vomiting. The most important occasion for their use is when *poison* is known to have been swallowed. Then the quicker and the more thoroughly the stomach is emptied, the better.

Handy emetics in every house are **Mustard**, a teaspoonful, or **Salt**, a tablespoonful, in a teacupful of *warm*, not hot, Water. Let it all be swallowed at once; and follow it in ten minutes with another teacupful of Warm Water, if it has not in that time taken effect.

Among emetic medicines, **Ipecacuanha** is the mildest and safest, and it is usually active enough. In bad cases of croup, with formation of membrane in the throat, **Alum** may be added to it. Of powdered Ipecac. a teaspoonful will usually produce vomiting; of the Syrup, a teaspoonful, perhaps needing to be repeated; of the Fluid Extract, half a teaspoonful.

Tartar Emetic (Tartrate of Antimony and Potassium) has already been spoken of as too severe and prostrating an emetic for use, at least as a domestic medicine. There are other mineral emetics (Sulphate of Zinc, Sulphate of Copper, etc.) which ought never to be used except under medical advice.

Epsom Salts. *Sulphate of Magnesium.* A very unpleasant medicine to the taste; an active, cooling **cathartic.** It is (its nastiness apart) useful as a purgative in some inflammatory affections of strong people; for delicate patients, milder medicines are better. *Dose,* from a Teaspoonful to a Tablespoonful, dissolved in Water.

Ergot: *Spurred Rye.* A growth on grains of diseased rye plants. When taken into the stomach, it has a tendency to promote **contraction** of the **womb** and of the **blood-vessels.** On account of the first of these effects, it is given after child-birth, to aid in the expulsion of the *placenta* (after-birth), and to check hemorrhage. Its causing contraction of the blood-vessels is a reason for its being prescribed for various hemorrhages, and also in *chronic inflammations;* especially of the spinal marrow. The *Wine* of Ergot is the preparation most employed. *Dose,* of it or of the *Fluid Extract,* from Half a Teaspoonful to two Teaspoonfuls, in Water.

Ether. A very volatile and inflammable liquid, colorless, and with a warm, strong taste. It is a quick stimulant when swallowed, or when injected under the skin by means of a hypodermic syringe. Its most important use is as an **anæsthetic,** breathed before surgical operations, to render them painless. It is, for this, much safer than Chloroform. The usual way of administering it is to fold a towel into the shape of a hollow cone (a chimney-sweep's hat, or sugar-loaf), in the bottom of which is placed a sponge, on which Ether is poured. This is then held over the patient's mouth and nose, for him to breathe, until he "goes to sleep," breathing hard, and dropping his hands, when they are held up, in unconsciousness. Then the Ether is removed. If an operation takes a great while, it may be necessary for the ether to be breathed again, to keep up the insensibility throughout. The *pulse* must be felt, however, constantly, besides watching the *breathing;* so that fatal narcotism shall not be brought on. With Ether, this will not happen, if due care be taken; with Chloroform, it is not certain always to be avoided, even with great precaution.

Eucalyptus. From the leaves of this Australian tree a *tincture* is made, as well as a solid *extract,* and the essential oil, *eucalyptol.* Lozenges of this drug are serviceable as a *warming expectorant,* in bronchial catarrh. Eucalyptus is also useful in chronic irritability of the *bladder. Dose* of the *tincture,* a teaspoonful; *extract,* one to ten grains; of *eucalyptol,* ten to twenty drops, in capsules or a mixture.

Fennel-Seed. A very mild **aromatic**; sometimes made into a tea for babies' colic; more often added to *Senna Tea*, or *Fluid Extract of Senna*, to keep that purgative medicine from griping the bowels.

Flaxseed. This makes a good soothing drink, Flaxseed Tea, for sore throat. Pour Half a Pint of boiling Water upon a Tablespoonful of whole Flaxseed, and stir it up for a few minutes. Then let it stand covered for a few minutes more; but do not put it on the fire to boil, as that would bring out the *oil* (Linseed Oil), which is not good to drink. What is wanted in the tea is only the *mucilage* of the seeds. Lemon-juice and sugar added will make Flaxseed Tea more agreeable.

Flaxseed *Meal* makes a good warm and soft *poultice*. Mix a sufficient portion of the meal with hot water, into a mushy mass. Spread this with a tablespoon on a piece of thin flannel or old muslin; then double in half an inch of the edge all around, to keep the poultice from oozing out. The best way to have a poultice warm when put on, is to spread it on a hot plate, close by the person to whom it is to be applied. When it is on, cover it at once with a piece of Oiled Silk, Oiled Paper, or thin Rubber Cloth, to keep the moisture in. Without this it will dry up very soon.

A very little Sweet Oil or fresh Lard put over the surface of a poultice before applying it will make it more soothing and more easily removed. For the latter purpose a piece of tarletan or gauze may be laid over it before it is applied. When pain in the part is severe, a Teaspoonful or two of Laudanum may be poured over the poultice before putting it on.

Fly-Blister. A plaster of the ointment of Spanish Flies (Cantharides), applied to draw a blister upon some part of the surface of the body. Such a remedy is only required for a rather severe case of internal inflammation, or for that of an eye or an ear; in either instance, not during the first day or two of the attack. In serious inflammation of the brain, a blister to the back of the neck, or even over a large part of the shaven scalp, is sometimes one of the best of remedies.

A blister is usually made by spreading a piece of buckskin, three or four inches square, with Cantharides ointment, covering this with a piece of thin gauze, and laying it upon the part. After from two to five or six hours (according to age and delicacy of the skin) the skin will feel very sore, and on taking the plaster off, the outer skin will be found to be raised in a blister. This may be tapped with the points of a pair of scissors, and the part may then be covered with a rag spread thickly with Simple Cerate. It will heal in a few days.

For inflamed eyes, the *back of the neck* is the best place for a blister; for severe inflammation of an ear, *just behind* that ear; the plaster being cut to fit there.

Gentian. Poets as well as botanists are familiar with this European flowering plant, whose root is used in medicine. Its *Extract* is made into tonic pills (Compound Gentian Pills) for indigestion, and its *Compound Tincture* is one of the best tonic preparations given for weakness of the stomach. Gentian is a pure and simple bitter stomachic **tonic.** Dose of the Compound Tincture, a Teaspoonful, in a little Water. As an appetizer it is best taken just *before* each meal. If given on account of slowness and discomfort in digesting food, shortly *after* the meal will be the best time for it. (See page 544.)

Geranium. Our native plant of that name, *Geranium maculatum* of the botanists, a common herb of American woods, has a root which

FIG. 187.

GENTIAN.

is **astringent.** A *tea* may be made by boiling an Ounce (about two Tablespoonfuls) in a pint and a Half of Water down to a Pint. Of this the *dose* is from a Tablespoonful to a Wineglassful, given as a country remedy for *diarrhœa.*

Ginger. A fine spice for culinary as well as medicinal use. Like the other **aromatics,** it is a product of tropical lands; a native of Asia, but now much cultivated in the West Indies. *Jamaica* Ginger is the most used with us. It is the root of a many-stemmed plant, three or four feet high.

Essence of Ginger is a very good medicine to have in the house. It is a warming stimulant to the stomach, and aids greatly in relief of ordinary *flatulent colic.* *Dose* of a strong preparation of it (as Brown's

Essence of Jamaica Ginger), ten to thirty Drops, in Water. It may also be applied *outside*, over the stomach and bowels; wetting a piece of thin flannel well with it, laying it on, and covering it with Oiled Silk to prevent too quick evaporation.

Ginger Tea is an old favorite stomach-warmer. A Tablespoonful or two of the bruised root may have a Pint of boiling Water poured on it, then leaving it to stand covered for an hour or so. We don't *boil aromatic* teas or other preparations, because that would drive off their *volatile Oils*, which are their active principles. Of Ginger Tea, the dose is one or two Tablespoonfuls at a time.

Glycerin. A sweet, transparent liquid, obtained from fatty substances. Only pure Glycerin (Bower's or Price's) should be used. Its principal employment is as an **external** application; to chapped hands, sore lips, etc. To a very delicate skin it is, when pure, somewhat irritating. Adding the same amount of *Rose-Water* makes a very nice preparation. Glycerin and *Borax* mixed make a good paste to put upon *sores in the mouth.*

In Teaspoonful doses, Glycerin is gently **laxative** to the bowels. It is given sometimes for this purpose to children.

Glycerin is **antiseptic**; that is, it tends to keep dead animal matter (meats, etc.) from putrefaction; and to ward off the effects of *decay-poison* upon or within surfaces of the body. It is therefore a good ingredient in washes for the parts involved *after child-birth.*

Glycerin with *Tannin* makes a very good astringent lotion for *frosted feet*, also for *enlarged tonsils, sore nipples, running from the ears,* and *fissure of the anus* (of which an account will be hereafter given). For the Glycerole of Tannin, rub together one ounce of Tannin (Tannic Acid) and four fluidounces of Glycerin, in a mortar; heat this mixture gently (best in a porcelain dish) until a perfect solution is made.

Gum-Arabic. A **soothing** (not nourishing) material for a drink, in cases of irritation of the throat, or cough. It is simply dissolved in water, a Tablespoonful to a Half Pint. Some persons like to chew and dissolve the gum in the mouth for the same purpose, instead of Licorice or Candy.

[**Compound Gentian Pills,** mentioned on page 573, have in each pill one Grain of Extract of Gentian, one Grain of Rhubarb, one quarter of a Grain of Blue Mass, and a quarter of a Drop of Oil of Cloves.]

Hamamelis Virginiana is the *Witch Hazel;* principal ingredient in *Pond's Extract*. *Tincture* of Hamamelis is much used by some physicians in England for *spitting blood;* if the blood comes from the stomach, one drop of the Tincture, in water, every ten or fifteen minutes at first; after a few doses, at longer intervals until relief is afforded. If it be hemorrhage from the *lungs*, the dose of the same Tincture may be one drop every hour or two. Larger doses will cause throbbing headache with some persons. It is also given for bleeding from the bowels or from piles.

Hoffmann's Anodyne. A strong warming **stimulant** to the nervous system, with some anodyne or pain-relieving power. It is useful in attacks of *gout in the stomach* or *heart, palpitation* from or with weakness, *angina pectoris* (which see, hereafter), *asthma*, etc. *Dose*, a Teaspoonful, in water.

Hops. Familiar to many people as present in some kinds of beer; the product of the Hop vine, cultivated in many places.

A *Hop-pillow* is sometimes used for sleeplessness. To prepare it, fill a small pillow-case with Hops, which have been sprinkled with alcohol to bring out the active principle.

Tincture of Hops, dose a Teaspoonful, is a mild hypnotic or sleep-producer. Tincture of *Lupulin* (the active principle of Hops) has more power of the same kind; but both are far weaker in this action than Opium or Chloral and their preparations.

Hot Water. Once in a while something becomes, in popular medicine, and even with physicians, "the rage." A few years ago, it was Blue Glass; a craze which added many tons to the importation of that transparent medium of delusion into this country. Now (1885) it is, with a large number of people, Hot Water. What is called the "Salisbury treatment" of chronic disorders (which ones? well, any that occur in imaginative patients; or, seriously taken, in low and sluggish states of the system), is about as follows: Three times a day, an hour before each meal, you must swallow a gobletful and a half of water at from 110° to 120° Fahr.; sipping it, if you wish, from a teaspoon, so as to occupy ten or fifteen minutes in swallowing it. This is to be kept up, in order for full effect, for six months. Its advocates claim that by this treatment obstinate cases of nervous affections, etc., have been cured, which had resisted all other management. When a case of chronic disease does resist all ordinary management, it will be safe and reasonable to try this practice for it. No more need be said on this subject here, except the remark that Hot Water, as a means of conveying heat to the interior of the body, is a stimulant to the *stomach*, to the great *nerve centres* back of the stomach, and to the general *blood-circulation*.

Like *rubbing, mustard-plasters*, or other stimulants applied to the *outside* of the body, such internal excitation may make a powerful and often serviceable alterative impression.

Hot Water is now much used by surgeons and obstetricians for the *arrest of bleeding*, from injured surfaces, from the womb after labor, etc. For this purpose, it should have a temperature of about 120° Fahr.

Hunyadi Janos Water. A **laxative** (mildly purgative) mineral water, sold in bottles. Dose, a Wineglassful.

Huxham's Tincture of Peruvian Bark. A good **tonic** in feeble conditions of the body, as in slow convalescence from an illness, running down with work in summer time, etc. *Dose*, a Teaspoonful, three times a day, in Water; best, a short time before each meal.

Hydrochlorate of **Cocaine.** A preparation of the active principle of the leaves of the South American *Erythroxylon Coca.* It has been found, when applied (a few drops of a four per cent. Solution in water) to the eyeball, throat, etc., to render the part insensible to pain; so as to greatly facilitate some surgical operations. Its uses as an internal medicine are just beginning to be investigated. *Dose*, five to ten Drops of a four per cent. Solution.

Hyoscyamus. From the leaves of this plant (Henbane) are made a *solid Extract*, a *Fluid Extract*, and a *Tincture.*

Hyoscyamus is an **anodyne**; a good deal like Opium in its effects on the system, but weaker; and, instead of constipating, tending to act gently on the bowels.

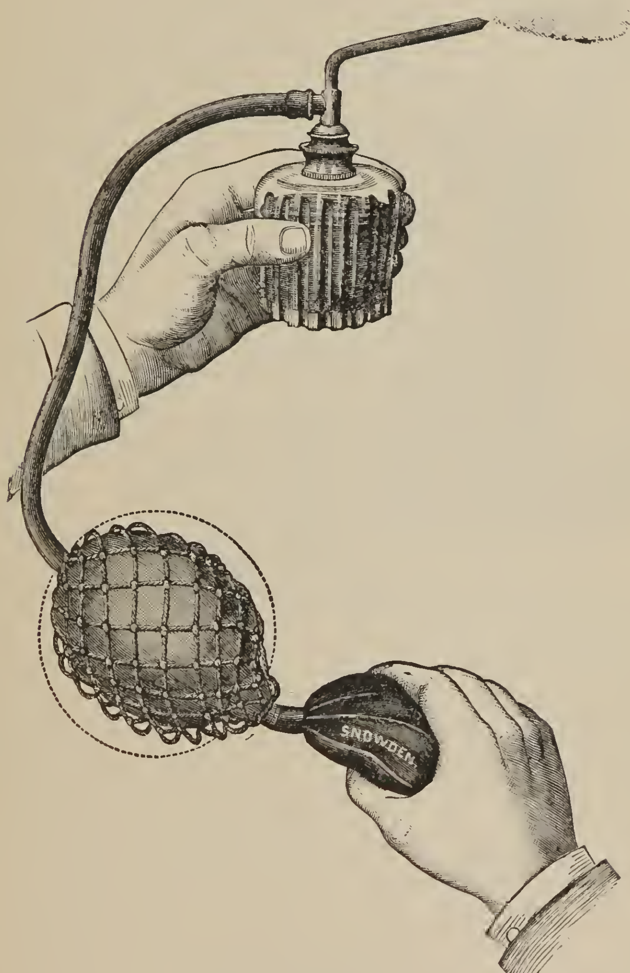
Of the Extract (solid), the dose is two or three Grains. Of the Fluid Extract, from two to ten or fifteen Drops. This last is a very good quieting medicine for the violent coughing spells of severe *whooping-cough.*

Hypophosphites. Compounds containing phosphorus, in a peculiar state of combination with other medicinal substances. Much used as an effective **tonic,** in low states of the system, is the preparation called *Fellows' Hypophosphites. Dose,* a Teaspoonful, in water, after each meal.

Ingluvin. An extractive obtained from the gizzard of the common fowl, and, like *pepsin*, used as a tonic to the digestive organs. Some physicians report it to be very effectual in relieving vomiting; especially the "morning sickness" of pregnancy. *Dose*, from three to ten grains.

Inhalation. This is breathing in vapor of some kind; which is

FIG. 188.



SPRAY APPARATUS.

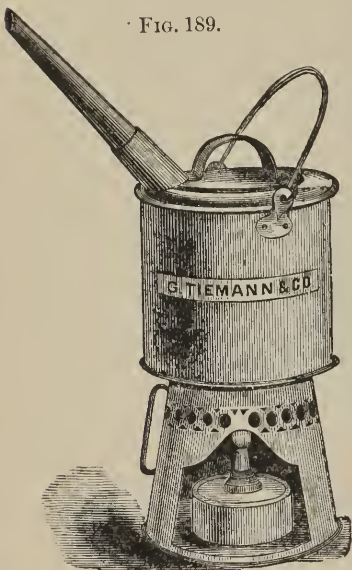
considerably employed in the treatment of diseases, especially of the throat and lungs; as well as (by the use of ether, chloroform, and nitrous oxide), to prevent pain during surgical or dental operations.

Smoking is a simple method of inhalation, acting most powerfully

when long pipes (narghileh, chibouk) are used, requiring chest-breathing to draw the smoke through the pipe. Chinese opium-smokers, however, actually inhale the vapor of the narcotic into their lungs.

Pure steam is soothing to an irritated throat. It may be inhaled by placing a towel, or a paper funnel, over a kettle which is kept boiling, and breathing the vapor which emerges from the spout.

Fig. 189.



CROUP-KETTLE.

A simple *inhaler* may be made of a wide-mouthed bottle or jar, through whose cork two glass tubes are passed, one straight, the other bent in the middle. The liquid to be inhaled from should not more than half fill the bottle. The straight tube should reach down a little below the surface of the liquid; the end of the bent one should stop an inch or so above it. Thus, when the patient draws a breath from the latter, the air which he receives has to pass through the medicated liquid. Tar, creasote, iodine, hops, laudanum, etc., may be thus inhaled. A volatile material, like *ammonia* or *nitrite of amyl*, may be inhaled directly from a bottle, small or large. The former of these is a potent stimulant in cases of fainting; the latter (nitrite of amyl), often gives relief in attacks of *angina pectoris*.

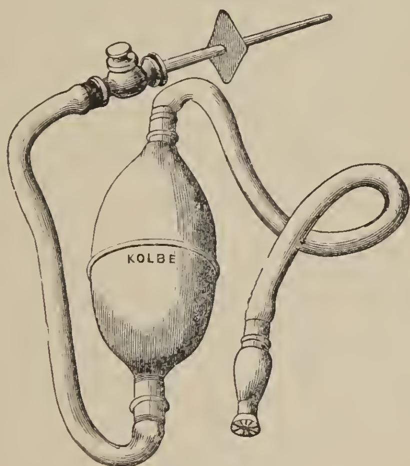
Instead of vapor, *fine powders* are sometimes blown into the throat. For sore-throat in children, *alum* powder may be thus blown in with a glass tube or a long quill; or with one of the powder-squirts sold by apothecaries for blowing borax, etc., into cracks to destroy insects.

Atomization is the introduction of a very fine *spray* of liquid into the throat and air passages. Such a spray is made by the *odorators* which are used to spread cologne or other perfumes in the air. Instruments are made for atomizing in cases of irritated throat, with which solutions of *ipecac.*, *chloride of ammonium*, etc., can be applied.

A *cigarette* for medicinal inhalation may be made by the use of a glass tube, six or eight inches long. Near one end of the tube put in a piece of fine soft sponge. Drop into the tube, from the other end, the material to be inhaled; tar, creasote, tincture of iodine, gum camphor, etc. Then insert a second piece of sponge near the upper end of the tube; through this the patient is to breathe for the inhalation. Cotton or tissue-paper will do instead of sponge for the purpose.

Injections (*enema, enemata*). These are used for various purposes. Most commonly, into the bowels, to empty the lower bowel, when this is considered more prompt and convenient than medicine by the mouth. The old-fashioned way was with a large syringe, holding about a pint. Now, gum-elastic ball-and-tube arrangements are employed, which one can use himself. Only common sense is necessary for the introduction of the oiled end of the tube of either kind; and gradual moderate force to cause the material to enter. It should then be kept by the patient for five or ten minutes, for an effectual operation. Smaller syringes, of course, half or quarter pints, are suitable for children. For a child, warm Water alone will sometimes suffice. A common mixture for **opening** injections is made by mixing well together a Pint (nearly) of

FIG. 190.



ENEMA SYRINGE.

Soapsuds (Castile-soap, at least for delicate persons), a Tablespoonful of Salt, a Tablespoonful of Molasses, and a Tablespoonful of Oil, either Sweet or Castor-Oil, according to the case.

Injections are used sometimes to **relieve severe pain**, or to **check** obstinate **diarrhœa.** Of the former, the most extreme kind of *colic,* passing a *gravel-stone* from the kidney to the bladder, or of a *gall-stone* through the gall-duct, or *strangury,* or threatened *abortion* (miscarriage during pregnancy) are examples. In *dysentery,* as well as in diarrhœa, such injections may be called for; **Laudanum** being most frequently (in all the above-mentioned cases) so employed.

For a grown person, the smallest amount likely to do good in such a way is thirty or forty Drops of Laudanum. It is best to mix it, for injection, with a small amount of Starch (prepared as for the laundry,

only thin enough to pass through a syringe), and then to use a small syringe—holding from Half an Ounce to two Ounces only. The object here is to have the material injected to **remain in the bowel,** as long as it will; so that the anodyne (Laudanum) may have time to take effect. Sometimes great suffering will justify sixty-drop injections of Laudanum, or even more; but such had better be used only under the advice of a physician. Other medicines also are occasionally presented for administration in the same way. Now and then four-Ounce enemata of *Flaxseed-tea* are employed in dysentery.

Nourishing enemata are often resorted to, when, for various reasons, food cannot be taken by the mouth. Half or a quarter of a pint will be enough at a time for this purpose; as it is important for it to remain and be absorbed. Beef-tea, Milk, or raw Eggs beaten up with Milk, will be the best materials. Sometimes pure fresh beef's blood is so used. An example of a nourishing injection may be the following:

To five ounces of finely scraped meat, and five and a half ounces of finely chopped sweetbread freed from fat, add three or four fluidounces of lukewarm water. Stir together into a pulp. It will be well to wash out the lower bowel with an injection of warm water, about an hour before introducing a nourishing enema.

Injections into the **nostrils, vagina,** and **urethra,** as well as the use of a syringe for the **ear,** had better be left, with rare exceptions, to be advised professionally, and carried out under careful direction. The same may be said of **Hypodermic** injections (into or under the skin).

It may be just mentioned, in view of a possible emergency in the absence of a physician, that the instrument used for Hypodermic injection is a small glass syringe made for the purpose, ending in a tube of steel or silver to puncture the skin and introduce the liquid. Having drawn into the syringe the amount to be used, the skin of the part selected (an arm, the back, abdomen, a thigh, or the calf of one of the legs) is drawn up with the forefinger and thumb of the left hand. With the right hand, the point of the tube (after being *oiled*) is pushed almost horizontally through the skin, and then the fluid is rather slowly pressed out of the syringe. The latter is to be withdrawn without twisting it; all must be done so as to cause as little irritation as possible. From one-third to one-half of the dose by the mouth is the quantity of any drug employed in this way. *Anodyne* and *stimulant* medicines are, more than any others, used hypodermically. Sometimes the habit of taking hypodermic injections of morphia is acquired, and is as hard to break as smoking opium or laudanum drinking.

Iodine. *Lugol's Iodine Solution,* the *Tincture* of Iodine, and *Iodide of Potassium* all have medical uses; but not, as a rule, in domestic

practice. We may except, perhaps, the **outward** application of *Tincture* of Iodine, which may be *painted* upon the chest (with a large camel's-hair pencil) for a continued cough (chronic bronchitis), or may be used as a **counter-irritant** in several other kinds of cases.

Physicians prescribe *Iodine* in *Lugol's Solution* as an **alterative** in *scrofula* and in *goitre* (which see hereafter). *Dose*, ten Drops, twice or thrice daily, in water. *Iodide of Potassium* is a very important medicine in a number of diseases; most particularly and certainly useful in constitutional *syphilis*, and especially of all in *syphilitic rheumatism;* also, in *aneurism of the aorta*. *Dose*, from five to twenty grains, dissolved in water, thrice daily.

Iodoform. A powerful drug, kept in the apothecary shops in the form of a powder. Sometimes prescribed as an internal medicine in *scrofula*, *ulcer of the stomach*, etc., in one-grain doses; but it is much more often used as an outward application. It is very healing to *foul ulcers*, *wounds* not doing well, *syphilitic sores*, etc.; being **antiseptic**; that is, corrective and preventive of decay and putrefaction. While, however, a little of the powder of Iodoform may be safely sprinkled now and then over a foul sore, to promote its cleansing and healing, it is not safe to use it without limit; as a large amount of it absorbed may be even poisonous. A bottle or box of it ought, when kept, to be labelled *Poison*.

Ipecacuanha. This has been already several times mentioned. It is an active but mild **emetic** in large dose. In smaller quantities, it is an excellent **loosener of cough (expectorant)**, and also a promoter of **perspiration (diaphoretic)**. It is one of the best of remedies in *dysentery*, in a way not exactly explained. Used in *Powder* (chiefly as an emetic, except when made into *pills*), *Syrup*, and *Wine*. The *Syrup* of Ipecac. ought to be in every family medicine chest. It is the best first medicine in *croup* and in *bronchitis* (a heavy cold on the chest, with cough at first dry, and needing to be loosened). Also, it will answer as an emetic. *Dose*, to *cause vomiting*, a Teaspoonful, repeated in ten or fifteen minutes if it does not take effect. As a *cough-loosener* (expectorant), five to ten Drops for an infant, a Quarter to a Half Teaspoonful for a grown person. While moving about, a Quarter Teaspoonful will usually be enough; Half a Teaspoonful will not often sicken the stomach if taken lying down, or just before going to bed. The *Wine* of Ipecac. is very similar in effect to the Syrup, but is rather stronger; and the form of Syrup has some advantage for use as an expectorant medicine.

Iron. There is iron in the blood of every man, woman, and child. Whether we ever have too much of it is not certain; but, without doubt,

many thin, pale, and weak people have too little of it. Then, to add some of it to our diet is really to improve our food. Iron is a **medicinal food.** Its common designation in the books is "**mineral tonic.**" The condition of *poverty of blood* is called, medically, "*anœmia.*"

Several preparations of Iron are used. Only a few chief ones need to be here mentioned. The strongest, and also the most convenient to keep and use, is the *Tincture of the Chloride of Iron. Dose,* ten to thirty Drops, in Water. The only objection to it is that it has a disposition to stain the teeth brown or yellow. This may be prevented by taking it through a **tube,** of glass, or of two quills put together. All druggists keep glass tubes for such purposes. The Tincture of Chloride of Iron is somewhat **astringent**; and therefore is useful in *hemorrhages.*

Syrup of Iodide of Iron unites the properties and influences of Iron and Iodine. It is, therefore, an **alterative tonic,** good in many cases of *scrofula* and in some other *chronic* complaints. An *alterative* medicine is one which tends to change the condition of an organ, or of the whole constitution; setting up its own innocent and transitory action instead of the disturbing and life-shortening action of the disease. *Dose* of the Syrup of Iodide of Iron, ten to thirty Drops, in Water, two or three times daily.

Pill of Carbonate of Iron (Vallet's Mass) is a very good form to make up with *Quinine* in treating obstinate cases of *chills* (intermittent fever). Three Grains of the Pill of the Carbonate of Iron with one Grain of Quinine, three times a day, taken for a month, after "breaking" the chills, will cure ninety-nine cases in a hundred of that troublesome affection.

Other "chalybeates," as preparations of Iron used to be called (Iron *springs* are still called *chalybeate* waters), are: *Citrate* of iron, a pretty red salt, not unpleasant to the taste, *dose,* five to ten grains; *Phosphate,* a green solid, *dose* five to ten grains; *Solution* (Liquor) of the *Nitrate* of Iron, the **most astringent** of these preparations, and beneficial in *chronic diarrhœa; dose,* ten Drops, in water, thrice daily; *Solution* (Liquor) of *Subsulphate* of Iron, generally called *Monsel's* Solution; a good strong astringent for **outward** *application,* to aid in *stopping bleeding* from any part. For the rest of the compounds of Iron (Ferrum) the reader may be best referred to works on *Materia Medica* ("U. S. Dispensatory," "National Dispensatory," etc.).

Jalap. The tuberous root of a vine, native of Mexico and cultivated in India. It belongs to the same family with the Morning Glory. It is a very active **purgative**; too much so for common use, but sometimes valuable in particular cases. In *dropsy* it is occasionally prescribed, along with Cream of Tartar, or with Squills. I remember its excellent effect in a very bad case of *scarlet fever*, with stupor and constipation. *Dose*, ten to twenty Grains.

Juniper. The berries of the Juniper tree or shrub. They are round, dark-purple in color, and have a sweet and somewhat spicy taste. Their use in medicine is as a **diuretic** in *dropsy*. A *tea* may be made by pouring a Pint of boiling Water upon Half an Ounce of bruised Juniper berries, stirring and then leaving it to stand for half an hour before pouring it off or straining it. A Tablespoonful of Cream of Tartar may be added; and at least Half a Pint of this tea may be drunk (a little at a time) in twenty-four hours, for dropsy.

Compound Spirit of Juniper is what pharmacists call an "elegant" preparation. It has the advantage of being given in *small dose*, a Teaspoonful or two, in Water; and is also, from its stimulant property, best suited to feeble patients, or those with delicate stomachs.

Lactucarium. An extract from the common Garden Lettuce (Lactuca). It is mildly narcotic and **anodyne**; promoting sleep like opium, but with much less power. The *Syrup* of Lactucarium (named *Aubergier's* Syrup), is the most convenient preparation. *Dose,* one or two Teaspoonfuls.

Lady Webster's Pills. The important thing in these is *Aloes.* They are **purgative,** and, like other aloetic preparations, have some effect in promoting a tendency of blood towards the pelvic region of the body. They have much reputation as aiding to bring on delayed or suppressed menstruation. This is called by physicians an **emmenagogue** action. *Dose,* one pill, at night. Some persons find half a pill enough to operate on the bowels quite as much as is best. A few will need to take a second pill for such an effect. It may be here repeated, that there is no certain emmenagogue medicine. We can only promote the restoration of the absent uterine flow, and succeed in a considerable number, but not in all cases.

Laudanum. Tincture of Opium. One of the strongest of the Opiate Medicines. It is therefore a powerful **anodyne** and **hypnotic** (*sleep-producer*).

Dose, for a grown person, from fifteen to thirty Drops. In diarrhœa, however, as small a dose as ten Drops will often answer. Children are more affected by opiates, in proportion to their age, than by any other kind of medicine. One drop will be more than enough for an infant less than a year old; at least to begin with.

Laudanum is often applied *externally* to relieve pain. On a sound part of the skin, in a grown person, Half a Teaspoonful may be so applied with safety; but only a few Drops at a time, even externally, in the case of a young child.

Anodyne injections into the bowels are most frequently made of Laudanum and Starch. (See **Injections.**) For *Hypodermic* injection (under the skin) Solution of Morphia is preferred.

In keeping Laudanum, it should be remembered that it strengthens with age, by evaporation of some of its Alcohol. (All *tinctures* are made with Alcohol.) What is left at the bottom of an old bottle of Laudanum may be two or three times as strong as a fresh article would be.

McMunn's Elixir of Opium is a preparation of still greater opiate strength than Laudanum. It has no very certain advantages over it. The same may be said of *Black Drop* (Vinegar of Opium), except that both of these are less disagreeable than Laudanum, and agree better with some stomachs.

Lavender. Aromatic flowers, well known for their pleasing per-

fume. The only preparation used as a medicine is the *Compound Spirit* of Lavender. It is an agreeable warming, gently **stimulant** article; good in *colic*, sometimes for *nausea* (sickness of stomach), and for *dysmenorrhœa* (painful menstruation). *Dose*, a Teaspoonful, in Water; often given in hot water.

Lead, Sugar of. Acetate of Lead. Sweet, but poisonous. A powerful mineral **astringent**. Physicians prescribe it in some cases of *dysentery*, after the first stage is over; and occasionally in obstinate *diarrhœa*, in *hemorrhages*, in *aneurism* of the *aorta*, and in *enlargement* (hypertrophy) of the heart. But it is not suited for internal use as a domestic medicine. *Dose*, half a Grain to a Grain, in pill or solution.

Outside, Sugar of Lead is a cooling (**sedative**) application, often used for *inflammations*. **Lead-water** may be made by dissolving it in Water; but with greater convenience by adding to Water the *Solution of Subacetate of Lead* (Goulard's Extract), which is a very strong liquid preparation. Of this last one Drop to four Tablespoonfuls of Water will be generally strong enough for Lead-water. It may be applied to a much-inflamed *joint*, or (outside) of the *eyeball* or *eyelids*. For the eyes, the best way to use it is with a *camel's-hair pencil*, *painting* the outside of the closed lids frequently with it.

Like Lime-water, Lead-water, when exposed to the air, absorbs Carbonic Acid gas, and forms a white *Carbonate*. This gives a milky appearance to it, but does not impair its cooling action upon the surface of the body.

All preparations of Lead are **poisonous**. Care must be taken with them accordingly, that none be swallowed unawares.

Leeching. See **Taking Blood**, page 536.

Licorice. See **Liquorice**.

Lily of the Valley. *Convallaria Maialis* of botanists. This charming wild-flower is considerably employed by physicians as a tonic to the **heart**. It had better not be taken, however, without medical advice. *Dose*, of the Fluid Extract, five to fifteen drops.

Lime-water. Simply a Solution of Lime in Water. Anybody can make it, by putting pure, clean, unslaked Lime in pure Water. Take a large bottle, and press into it enough Lime to fill about one-fourth of its depth. Pour in Water enough to fill it full, then cork and shake it awhile. On standing, the clear Lime-water will be ready for use. If all the Lime is dissolved, add a little more, so as to be sure that the Water is saturated; that is, contains as much as it will dissolve.

Lime-water is the main stand-by as a domestic remedy for **vomiting**, or for **nausea** threatening it. *Dose*, from a Teaspoonful to a Tablespoonful. When nourishment is needed, a Tablespoonful of Milk may

be added to one of Lime-water. Otherwise, it may be diluted with an equal amount of Water, or Cinnamon-water.

Lime-water is often added with great advantage to Milk for babies, when they have *sour stomach* or *diarrhœa,* as it is **antacid** and somewhat **astringent.** A Tablespoonful of it may be put in every Half Pint of the child's food, so long as such an occasion exists for it. No harm will be done if it should be taken in that way for days, or even weeks, together.

Liquorice, also spelled **Licorice.** The *root* of an herb growing on the shores of the Mediterranean Sea. The *Extract* is chiefly used. It is black, hard, and sweet. There is also a *Fluid* Extract. Neither has any important property except some soothing influence over the lining membrane of the throat. By "sympathy of contiguity" this influence extends from the gullet into the windpipe, and thus Liquorice helps to soften and loosen *cough.* It is the largest (though not the strongest) ingredient in Wistar's Cough Lozenges, which contain also a little Opium ; and it is used to flavor cough mixtures and other medicines.

FIG. 191.

LOBELIA INFLATA.

Lithia may be just mentioned here, as one of the **alkalies,** like *Soda* and *Potassa.* It is considered by physicians a useful medicine for *gout.* The *carbonate* is employed in one- to three-grain doses. It has no place in domestic practice.

Lobelia. A common weed, *Lobelia inflata.* The *cardinal flower* of the swamps is another, more beautiful, species of the same genus, not used in medicine.

The leaves and tops of this plant are employed best in the form of *Tincture.* It is a powerful **sedative** medicine; capable, like tobacco, in large doses, of producing fatal prostration. Its most important use is for *asthma.* It is often very relieving in attacks of that affection. It may be safely given (watching its effects,

and stopping it at once if vomiting or great faintness result) in Half-Teaspoonful doses, every half hour or hour, until three or four doses, if necessary, have been given. Another way is to give twenty Drops of Tincture of Lobelia, with twenty Drops of Syrup of Ipecac., every twenty minutes, for three or four doses.

Logwood. The reddish heartwood of a Central American tree. It was once more used than now, as a mild **astringent** for *diarrhœa.* A *tea* may be made of it by boiling an Ounce of it, with a Drachm of Cinnamon, in a Pint of Water, for ten minutes. *Dose*, a Wineglassful or less.

Magnesia. A valuable *home* medicine, as an **antacid laxative.** It is particularly good when there is *constipation*, with *sick stomach* and *headache.* Even at the beginning of *diarrhœa* and *cholera morbus*, it is many times the best corrective medicine. *Calcined* Magnesia is the preferred form, and, in Philadelphia at least, *Husband's* is the best. It has almost no taste, but causes a gritty feeling on the tongue that is not pleasant. Water does not dissolve it; so it must be stirred well in a little Water when taken. *Dose*, a full Teaspoonful for a grown person, if designed to operate on the bowels. Much less will do to relieve acidity and nausea. Magnesia is not a good medicine to take when one has *piles;* as it sometimes produces a *burning* in operating freely. It is not, however, a powerful cathartic. *Citrate* of Magnesium has been spoken of on a previous page.

Malt Extract. Especially in Germany, large use is made of preparations under this name. As sold in this country, some of them are too sweet to agree well with the stomach. The best is Johann Hoff's "Malz-Extract;" made in Berlin, and imported in short thick bottles. The use of this extract is as a **tonic,** particularly when digestion is weak. It may be taken at meals, a quarter of a tumblerful at once. When taken at bed-time, it is promotive of sleep.

Manna. A sweet substance obtained from the trunk of the flowering ash tree, in the countries bordering on the Mediterranean. Its only important use is to open the bowels of children and delicate people, including women during pregnancy. It may be eaten like sugar. The *dose* is not very definite; a little experience will show how much is required for the desired effect.

Massage (rubbing). See later, under **Nursing.**

Mineral Waters. A volume would be required to treat fully of these; and such volumes have been written.* They may be classified simply as: 1. Alkaline. 2. Saline. 3. Sulphurous. 4. Chalybeate, containing Iron. 5. Purgative. 6. Limestone or Calcareous. 7. Thermal, *i. e.*, Warm or Hot Springs. While some special properties and effects upon the system in states of disease belong to each of these classes of waters, with differences also among the members of each class, they all agree in exerting an *alterative* influence, which is especially likely to be beneficial in *chronic* disorders. Very much is added, also, to this effect by the pure atmosphere of the localities of mineral springs, with rest, change of scene, social enjoyment, etc. Still, something important may be ascribed in certain cases to the action of the mineral waters them-

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* See Walton, on the Mineral Springs of the United States and Canada: D. Appleton & Co., New York.

selves; although many of them fail to exhibit the same virtues when bottled up and sent to the city homes of invalids, as they do when these go and take them from their natural sources, or resort to the warm or hot natural medicated baths. Some particular waters are largely supplied for particular remedial uses; as the Apollinaris, an agreeable table carbonated (effervescent) drink; Hunyadi Janos, Püllna, and Friedrichshalle, for purgative action; Vichy water (containing soda), to relieve acidity, etc. The most famous mineral waters in our country are those of Saratoga (several kinds, all more or less *saline;* with more or less sulphur also, or iron, iodine, bromine, etc.), Sharon (*saline* and *sulphurous*, with some *iron*), Richfield (*sulphurous*)—all these in the State of New York; Bedford (chalybeate, *i. e.*, containing iron, and purgative), in Pennsylvania; and a remarkable variety of mineral springs among the mountains of Virginia—White and Red Sulphur, Warm Springs, Hot Springs, etc. In *chronic rheumatism, liver* and *kidney* disorders, obstinate affections of the *skin*, and *nervous* troubles of some standing, the best alterative effects from using mineral waters, internally or in baths, may be hoped for. A physician's advice had better always be obtained before they are resorted to in cases of serious disease of any kind.

Morphia. The principal *alkaloid* or active principle of Opium. Its *sulphate* and other *salts* (chemically so called) are used in medicine. They are powerfully **anodyne** and **hypnotic** (sleep-producing). What is commonly called "Solution of Morphia" in this country is Solution of Sulphate of Morphia, one Grain to an Ounce of Water. *Dose*, a Teaspoonful, containing one-eighth of a Grain of the Morphia Salt. Sometimes we meet with *Magendie's* Solution of Morphia, which contains sixteen Grains to the Ounce; sixteen times as strong, therefore, as the other. If using either, then, we must be very careful to know which it is. It is not necessary to have Morphia in the family medicine chest; Laudanum and Paregoric will do for Opiates under almost all circumstances.

Muriatic Acid. See **Chlorohydric** Acid.

Musk. A very strongly odorous substance, secreted by the musk-deer of the Himalaya Mountain region, in Asia. It is **antispasmodic,** that is, composing to disturbed nerves. Prescribed sometimes for *whooping-cough* and for *convulsions*. *Dose*, five to ten Grains, in pill or mixture.

Mustard-Plaster. One of the most frequently useful of all domestic remedies. When anybody is suffering pain, or, indeed, illness of any kind, if you do not know what to do, put on a *Mustard-Plaster*, near the seat of the trouble. Should you not find where that is, put the

mustard-plaster on the middle of the back. If properly attended to, it can do no harm; and in ninety-nine cases in a hundred it will do some good; sometimes a great deal of good.

To make one, mix from one to three or four Tablespoonfuls of Mustard (either white or black, so called) with the same amount of Wheat or Indian Flour. Mix these with enough hot water to make a paste. Then, on a hot plate, near the person who is to have it on, lay a piece of soft old muslin, or thin flannel, twice as large as the plaster is to be; but spread the Mustard and Flour paste only on half of the rag. This done, double the other half over it, and stitch the edges together, all around; or, turn the edges over instead, to keep the stuff in. It may be put on at once, while warm, and left on until it is felt to burn quite smartly, if the patient is conscious. If not, it must be looked under, in a quarter of an hour or so, and, if the skin is decidedly red, take it off. As soon as it is removed, Lard, Tallow, Cold Cream, or Vaseline should be gently rubbed over it, or a fresh rag spread with one of them may be laid upon the part. We never intend to *raise a blister* with Mustard, it is too severe. The aim is just to *heat the skin* very actively, mostly for its use as a **counter-irritant**, to relieve some irritation of an internal organ.

Ready-made Mustard-Plasters can be had now of Pharmacists, and are very convenient. One of them has only to be dipped for a moment or two in hot water, and it is ready to apply at once. It is well always to have a supply of these in the house.

Mush and Mustard **Poultices** are often very useful in inflammatory and other painful affections. They are made with one part of Mustard to four parts of Mush (of Indian meal) mixed, and applied hot on the chest or abdomen, as required, and covered with Oiled Silk, or Oiled Paper, or Rubber Cloth, to retain the moisture. Such a poultice may stay on for hours, keeping up a moderate and bearable excitement of the skin (warming and counter-irritant) much longer than could be borne with a strong Mustard-Plaster.

Myrrh. A gum-resinous substance, obtained from one or more trees in Africa and Arabia. From ancient times it has been known ("frankincense and myrrh") for its aromatic properties. Internally given, it is stimulant and tonic, and is an ingredient in some preparations intended to act upon the bowels or to restore suspended menstruation.

For home use, the **Tincture** of Myrrh is very serviceable in the care of the *mouth.* A few Drops of it in a little water, say about twenty Drops in a quarter of a Tumblerful, used as a mouth-wash, will correct a bad odor in the breath. Such a wash may be used with advantage twice daily, in cleaning the teeth. When the teeth begin to decay, a

strong myrrh wash, often used, will check or retard their destruction. If a hollow tooth becomes tender, and begins to ache, *pure* Tincture of Myrrh put into it will sometimes stop the trouble at the beginning. If, however, it does not at once give relief, the stronger application of Creasote should follow it.

Nitrate of Silver, or *Lunar Caustic.* Physicians often use this as an **alterative** application to the *throat, eyes,* or ulcerated *skin,* in certain states and stages of *inflammation.* It is also sometimes given in pill as a medicine; most beneficially in *chronic* (*gastritis*) *inflammation of the stomach. Dose,* internally, a quarter of a Grain (usually with as much of Opium), thrice daily, gradually increased, when it does good, to nearly or quite a Grain. It was formerly much employed in the treatment of *epilepsy.* When long continued, it has sometimes dyed the skin, making the face almost as black as ink.

Nitre. A name for *Saltpetre;* called by chemists *Nitrate of Potassium.* It is a cooling, **sedative** salt, when taken internally. In ten-Grain doses it is a useful medicine in *acute bronchial* inflammation (bronchitis), and might be added with advantage more often than it is, to *cough-mixtures* of the loosening kind.

Sweet Spirit of Nitre (*Spirit of Nitrous Ether*) is a liquid preparation, whose properties are gently **stimulating, diaphoretic, diuretic,** and **composing** to the nerves. It has long been one of the most popular of domestic medicines for fever. It does the most good, however, in the *least inflammatory* conditions, and, when fever is high, its dose should not be large. Half a Teaspoonful of it in a Tumblerful of cold Water, drunk, a little at a time, as thirst prompts, through the night, will be more likely to relieve a hot fever, with the coming of perspiration, than a whole Teaspoonful taken at once. This is because the large doses "stimulate the circulation above the secreting point," to use an old but true medical phrase.

To *increase the action of the kidneys,* as a *diuretic,* Sweet Spirit of Nitre is very often useful. For this purpose, in the absence of high fever, larger doses will suit than when that condition is present. From Half a Teaspoonful to a Teaspoonful, well diluted with water, will be a diuretic dose for an adult; to be repeated in a few hours, if needful.

Nitrite of Amyl is a powerful agent, used by inhalation, from one to four or five drops only at a time, as a remedy for the attacks or paroxysms of *angina pectoris.* It commonly causes immediate flushing of the face. If used, it should be as soon as the attack (with distress and pain about the heart, and along the left arm) begins.

Nitroglycerin, the explosive, from which dynamite is made, is occasionally used as a medicine for angina pectoris, etc., by physicians. Dose, one-hundredth of a drop. It is too strong to be employed as a domestic medicine.

Nitro-muriatic Acid. Called *Nitro-chlorohydric Acid* by chemists. It is a mixture of Nitric and Chlorohydric (Muriatic) Acids, and contains some free Chlorine gas. It is important in the arts, as the only thing

that will dissolve gold. As a medicine, it is an **appetizer**, and a mild tonic to the **liver**. "Bilious attacks," in persons subject to them, may be treated first with Blue Pill, and afterwards with Nitromuriatic Acid. *Dose*, three or four Drops, in Water. It is best taken through a glass tube, as it will act on the enamel of the teeth if left long in contact with them. Also, a silver spoon should not be allowed to touch it, as it dissolves silver as well as gold.

Nitrous Oxide. Formerly called "laughing-gas," because of its exhilarating quality when breathed mixed with air. It is now the favorite material for dentists to use so as to draw teeth without pain. It is, thus, one of the **anæsthetics**, so called, and, when breathed for only a short time, it is probably the safest of them. It must, however, be **pure** for such use, and skill and care are necessary on the part of the dentist who employs it. Otherwise, it would be quite possible for a person to be anæsthetized to death, even with Nitrous Oxide. Horace Wells, the dentist, who first proved that this property belongs to it, is said to have at last become a victim to its over-use.

Nux Vomica. A poisonous seed or nut ("dog-button" of country people) from a tree called *Strychnos Nux Vomica*, growing in the East. Its active principle is the alkaloid *Strychnia*.

Nux (as the homœopaths call it) is best used in *Extract* or in *Tincture*. Both are bitter **tonics**, with a powerful action on the nervous system, especially the **spinal marrow**. Leaving what we have to say about this last action until we come to *Strychnia*, it may be mentioned that physicians often find *Extract* of Nux Vomica a good addition, in small dose (a quarter to half a Grain), to tonic pills for continued debility. The *Tincture*, in ten-Drop doses, in water, is an excellent medicine for great *weakness of stomach*, with *flatulence*. Larger doses (if even these) should not be ventured upon without medical advice; on account of the very powerful nature of the active principle of this drug. The Tincture of Nux Vomica should be marked **Poison.**

Olive Oil. Probably the gentlest of all **laxatives**; in Teaspoonful to Tablespoonful doses. For a delicate infant, needing to have the bowels acted upon, a Teaspoonful is very good. The imitation of true Olive Oil, sold under its name, or as "Sweet Oil," is less bland, but will answer if the genuine European article cannot be obtained.

Sweet Oil, *saturated with Camphor* (Camphorated Oil), makes an excellent application for more or less inflammatory swellings; as, for example, a mother's breast threatening to become inflamed while she is nursing; or, more often, when her infant ceases to draw milk, as from illness or the death of the child.

Sweet Oil, with an equal quantity of *Aqua Ammoniæ* (water of Ammonia) or Aromatic Spirit of Ammonia, makes *Volatile Liniment;* an excellent outward application for sore throat.

FIG. 192.

POPPY FLOWER.

FIG. 193.

SEED CAPSULES OF THE POPPY.

Opium. If all the medicines in the world were to be destroyed, except three, and we could choose the three, they should be **Quinine**, **Opium**, and **Iron**. The first cures the greatest number of cases of illness; the second gives the happiest relief to severe pain; and the last does the most to build up a debilitated body.

Under the heading of **anodyne** medication, on a previous page, enough has been said on the general subject of the action of Opium and its preparations. Of these, also, *Laudanum* and *Morphia* have been mentioned. The *dose* of Opium in substance (got from the seed-capsule of the white-flowered Poppy plant of the East) is one Grain; equal to thirty Drops of Laudanum, or a full Teaspoonful of Solution of Morphia (not Magendie's Solution).

Paregoric is the *Camphorated Tincture of Opium.* Its odor and taste are partly due to the Oil of Anise-seed with which it is flavored. It contains only one Grain of *Opium* in a Tablespoonful of *Paregoric;* being therefore a much weaker Opiate than Laudanum; which has about four Grains of Opium in each Teaspoonful. *Dose* of Paregoric, a Teaspoonful, more or less, according to the occasion for its use. In *diarrhœa,* for example, quarter-teaspoonful doses will often answer the purpose. Smaller doses, of course, are suitable to give to *children.*

Pepper. Of the two kinds used with food, Red Pepper (*Capsicum*) is the more stimulating. It is sometimes given by physicians as a stimulant, in five-grain pills. A much more common use for it is to excite the circulation of the skin, as a **rubefacient**; a power which it shares (though in less degree) with Mustard. In *cholera,* when the skin is cold, rubbing with Whisky and Red Pepper is one of the best things to restore the circulation. It may be employed for the same purpose in any analogous, low and cold, condition.

Peppermint. *Essence* of Peppermint is a pleasant, warm **aromatic**; given as good for *colic* and *sick stomach. Dose,* ten Drops for a grown person; for an infant, from two Drops down to Half a drop (that is, add one Drop to a Dessertspoonful of Water, and give of this a Teaspoonful at once).

Pepsin. Hard to get pure. Given for weak digestion. *Dose,* 5 grains.

Permanganate of Potassium. This "salt," which gives a beautiful red color to Water, has a remarkable action on all organic (animal or vegetable) matter. It is one of the best **disinfectants.** Five Grains of it in a Pint of Water will make a solution suitable to wash out vessels used in the sick room with patients having contagious or infectious diseases.

Internally, Permanganate of Potassium is highly recommended (in two-Grain doses, dissolved in distilled Water, twice daily) by some physicians in *amenorrhœa* (delay or suppression of the monthly courses). As it sometimes disagrees with the stomach, it must be used with care, and can hardly be placed among the domestic medicines.

Phosphorus. Too dangerous for use as a domestic medicine, this is sometimes given by physicians as a powerful **nerve-stimulant.** *Dose,* one-thirtieth of a Grain. **Phosphates** are safe compounds, often used. Parrish's and Horsford's are very popular **tonic** preparations. Of the latter (Acid Phosphates), the dose is Half a Teaspoonful, in water, just before or after a meal.

Pink-Root. This American plant (*Spigelia Marylandica*) is a very good medicine for *worms* (*vermifuge*). It may be made into a *Tea* thus: Put together Half an Ounce of broken and bruised Pink-root; Senna

Leaves and Fennel Seed, each two Drachms; Manna, one Ounce; and boiling Water, one Pint. Let it stand (after stirring) covered for an hour. *Dose*, a Wineglassful for an adult, Half a Wineglassful for a child two or three years old, thrice daily. It is best not to go beyond these doses; as, in very large amount, Spigelia acts poisonously.

FIG. 194.

SPIGELIA MARYLANDICA.

There is a Fluid Extract of Spigelia, also, a convenient preparation; *dose*, a Teaspoonful; and still better (because the Senna makes it more sure to pass off by the bowels), the Fluid Extract of Spigelia and Senna; dose of this also, a Teaspoonful, repeated every two or three hours until it operates.

Podophyllin, or *Resina Podophylli.* This is an active principle obtained from the root of the common May-apple (Podophyllum peltatum). The powdered *root* itself may be taken in doses of ten to twenty Grains. Of *Podophyllin,* the dose is but from one-sixth to one-half or three-fourths of a Grain. It is a powerful, though slowly acting, **cathartic**; believed also to act more than most purgative medicines on the *liver.*

Potassa (Potash). Solution of Potassa is sometimes given as a

FIG. 195.

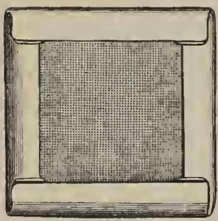
MAY-APPLE (PODOPHYLLUM PELTATUM).

medicine by physicians. *Caustic* Potassa (vegetable caustic) is the solid stick, which, with care, may be used to destroy warts. More often, **Bicarbonate** of **Potassium** is employed as an **antacid**, in ten or twenty-Grain doses; and as an ingredient in *Effervescing Draught* (which see). This Bicarbonate is also the *Sal Aeratus* (gaseous salt) of the bakery; as, like Bicarbonate of Sodium, it gives off Carbonic Acid gas when an acid, such as Tartaric Acid, is added to it.

Poultices. These are used to warm and soften the skin, when applied to inflamed parts of the surface of the body; particularly when

a *gathering* (suppuration, abscess) is expected. Also, they often do good in cases of *internal inflammation* (*pneumonia*, for example) by favoring the return of blood to the skin, and thus unloading the part troubled with excess of blood.

FIG. 196.



POULTICE, COVERED WITH GAUZE.

Flaxseed (Linseed), *Bran*, *Bread*, *Mush*, *Slippery-Elm Bark*, *Charcoal*, *Chopped Carrots*, and *Lye* are among the materials most used for poultices.

Flaxseed meal, mixed with hot Water, makes a good, soft, convenient poultice for common use in "gatherings" of different parts of the body. Mix the meal well with enough hot water to make it hold together and spread easily, and yet not too soft to stay where it is put; a poultice should never run. For use, it should be spread upon a piece of flannel or muslin laid on a hot plate or hot waiter; something hot, near the patient, so that it will be warm when applied. The edges of the rag should be turned over, to the width of about an inch, to keep the stuff in, and upon it may be laid a piece of thin and soft *gauze* or tarletan. The latter makes the poultice easier to remove, but is not otherwise necessary. A few drops of Sweet Oil (or Lard Oil) may with advantage be poured, or a little Vaseline spread, upon the surface of a Flaxseed Poultice. When *pain* is great, Half a Teaspoonful to a Teaspoonful of Laudanum may be poured upon it. As soon as the poultice is put on the part, it should be covered with a piece of Oiled Silk, Oiled Paper, or thin Rubber cloth, to prevent evaporation, and thus keep it moist. Without this, it will dry and become hard and cold in a little while. *Bran* will do as a substitute for Flaxseed meal, when the latter cannot be obtained.

Bread and *Mush* poultices are made and applied in the same way. One made with crumbs of *moderately stale bread* and *hot Water* (better this always than milk, which may sour unpleasantly) is as soothing to the part as any poultice can be. Powder or slips of *Slippery-Elm Bark* are also very soft, and perhaps more cooling to an *irritated skin*.

A *Mush* poultice (of Indian meal) is the warmest kind; very suitable for application in *internal inflammations*, as *pneumonia*, *pleurisy*, *dysentery*, etc. It may be made by using hot mush, prepared just as if it were to be eaten; spread, applied, and covered in the same way as a Flaxseed poultice.

In changing or renewing a poultice, be sure to have the fresh one warm, close by the patient, so that the part will not remain for a moment uncovered. Should it do so, the chill caused might more than undo all the good effected by the poultice.

A *Charcoal* poultice is only suitable for a nasty, and especially a *mortifying* (gangrenous), part suffering from disease or injury. Finely powdered charcoal should be used; two parts of it with one part of Indian mush. Warmth is not important for this kind of poultice unless the limb or other part affected is cold at the time. Such poultices need to be changed often. *Yeast* poultices are sometimes employed, but I am quite doubtful of their beneficial action.

Lye (Ley) poultices may be made by mixing common lye from ashes, or a druggist's Solution of Potassa, with Flaxseed or Indian Meal. They are not often used nowadays, being formerly applied to punctured and torn (lacerated) wounds, as a means of preventing *lock-jaw* (tetanus). Better, for this purpose, is *Laudanum*, applied directly to the part. If a Lye poultice is so used, Laudanum should be added to it.

Püllna Water. A strong, bitter German **purgative** Mineral Water. It, as well as *Friedericshalle* and *Hunyadi Janos* waters, are sold by druggists, in bottles, everywhere. *Dose* of Püllna water, one or two Tablespoonfuls.

Pumpkin Seeds. These have a deserved reputation, as capable of driving a tapeworm out of the bowels. For such use, an ounce (about two Tablespoonfuls) of the fresh seeds should, after removal of their outer skin, be beaten, with a Tablespoonful of Sugar, into a paste, then mixed in milk or water, and drunk, either at once or in two draughts half an hour apart. Such a dose should be taken after fasting for from twelve to twenty-four hours, and should be followed in three hours by a Tablespoonful dose of Castor-Oil.

Quassia. The wood of a West Indian tree. It is bitter, and a good, simple stomachic **tonic,** suitable for *dyspepsia.* It is best taken in the form of a *Tea.* Half an Ounce of it may be boiled for an hour or two in a Pint of Water. *Dose,* Half a Wineglassful, two or three times daily.

FIG. 197.

CINCHONA CALISAYA.

Quinine. What is commonly so called and used in medicine is the *Sulphate of Quinia.* The alkaloid Quinia is the most valuable of several obtained from Peruvian Bark; that is, the bark of different species of Cinchona tree. These are native to the Andes of Peru, growing naturally as evergreens, upon high ground, from nearly 400 to over 10,000 feet above the level of the sea. The Cinchona tree has, however,

been found to be capable of cultivation in similar regions of the Himalaya mountains of India. The trees are from forty to eighty feet in height, with laurel-like leaves and fragrant rosy-white flowers. Expeditions lasting several months are made by the natives of Peru, to collect bark from trees which they fell for transportation. Having been known for a long time in Peru to be capable of curing chills and fever, the Countess of Cinchon, more than a hundred years ago, took some of it, with that knowledge, to Europe, and thus her name has been given to the tree.

Yellow *Calisaya* Bark is the richest in Quinia; next to it come the *Pale* and the *Red* Barks. The most important *alkaloids* got from them are *Quinia, Cinchonia, Quinidia,* and *Cinchonidia. Quinoidin* is an extractive containing two or more of them. All of these have similar properties to Quinia, but require rather larger doses to produce the same effects.

Because water dissolves very little of either of these *pure* alkaloids, they are chemically combined, for use, with *acids,* especially Sulphuric Acid—making *Sulphates.* Sulphate of Quinia, as already said, is *Quinine.* It is not very soluble in water; a little Aromatic Sulphuric Acid (Elixir of Vitriol), about two Drops to a Grain, is added in making a solution of it.

Quinine is a bitter **tonic**, but not a *stomach* tonic only; it acts decidedly, also, on the nervous system. When this is debilitated, it will do as much good as any medicine, unless in cases where *Iron* or *Strychnia* is suitable, to improve its tone. But the heroic value of Quinine is in the treatment of **malarial fevers**; that is, *intermittent, remittent,* and *pernicious* (or congestive) fevers. All of these prevail most in the autumn, although considerably also in the spring of the year. All of them are characterized by *periodicity;* that is, more or less regular *spells,* following each other at intervals or periods. *Chills* occur either once a day, or every other day, or on the first and fourth days (quartan ague); sometimes, only once in seven days. Each chill, also, is followed by a fever, and that by a sweat. *Remittent* fever does not go off during the interval, but only remits (slacks up, so to speak) its violence; hence its name. [More about these hereafter.]

So marked is the power of Peruvian Bark and its alkaloids, especially Quinia, to *stop chills,* and to *cure remittent fever,* that it may be well called a **specific** remedy, even an *antidote* for them.

Dose of Quinine, as a simple **tonic** in cases of weakness, one or two Grains every four hours, until from six to eight Grains are taken daily. The form of *pills* is most convenient for this use; one-grain or two-grain pills. For the cure of *intermittent* (chills, ague), more is needed;

from twelve to fifteen Grains daily for about three days, and then lessening gradually, to ten, eight, and six grains a day, continuing the latter for two weeks. In *pernicious* intermittent, in the Southern States, yet larger doses are required. *Remittent* fever will be spoken of, and the principles of its management mentioned, hereafter; it may just be said here, that it needs the knowledge and judgment of a physician to deal safely with it.

Cinchonia (Sulphate) agrees with some persons better than Quinine. The latter, in doses amounting to over eight Grains daily, makes many people's *ears ring*, or hum, or roar. Cinchonia hardly ever does this; at least, in moderate doses. Quinidia and Cinchonidia also suit certain patients the best.

The popular idea that *Quinine* injures the health, especially when long taken, is entirely mistaken. If prescribed only in ordinary doses (not more than fifteen or twenty Grains in twenty-four hours), it does no harm, and, in malarial cases, may often save life, as well as shorten the time of sickness very much. In *over-doses*, it may cause temporary, or possibly permanent, deafness. *Extreme* doses might even kill, by poisonous action on the brain; but such amounts are never given by physicians. I have known Quinine to be taken, as much as from six to eight, or occasionally ten, Grains daily, by a delicate person, for years together, with good action as a tonic, and no disadvantage.

Quinine may be taken in malarial cases, whether there be *fever* or not; for example, in periodic attacks of *neuralgia*. Other diseases, also, in certain localities, take on the periodic form: but for these we must refer to larger medical works.

Respiration, Artificial. See *Drowning*, later, under **Accidents and Injuries.**

Rhatany. This is the root of *Krameria*, a South American shrub. It is **astringent**; its *Tincture* is the best preparation. *Dose*, a Teaspoonful, in water. Used especially for diarrhœa.

Rhubarb. The root of an Asiatic and European plant. Our pie-plant, whose leaves have such a pleasant fruity tartness, is another species of the same genus. Rhubarb is a gentle **purgative**, with also some **tonic** property, which makes it especially adapted to *dyspeptic* persons, and others disposed to *constipation*. *Dose*, for such a use, from three to six or eight Grains. Many people buy the root in pieces, as it comes in the shops, and cut off daily what, on trial, they find to suffice for them. Less trouble attends the use of *Simple Rhubarb Pills;* one or more as

Fig. 198.

RHUBARB (RHEUM PALMATUM).

may be necessary; if only one, bedtime will be the best time to take it; if two, one at night and one in the morning.

Compound Rhubarb Pills contain also *Scammony* and *Aloes* (both strong cathartics), as well as *Myrrh*. They are at least twice as active as Simple Rhubarb Pills.

Simple Syrup of Rhubarb is a very good opening medicine for infants. *Dose*, for a babe, about a Teaspoonful.

Spiced Syrup of Rhubarb is one of the oftenest useful of all domestic medicines. It contains, besides Rhubarb, *Cloves*, *Cinnamon*, *Nutmeg*, Alcohol, Sugar, and Water. It is therefore **aromatic** and gently stimulant, as well as promotive of action of the bowels. This last effect, that of a purgative, is so slight, that it is generally useful in correcting irregular intestinal secretion, and thus curing *diarrhœa*, if given at an early stage. It is also very relieving to *colicky pain* with diarrhœa; and is an excellent "vehicle" with which to mix other medicines of

nasty taste, as Castor-Oil; or those which do not readily dissolve in pure Water.

The *dose* of Spiced Syrup of Rhubarb is from a Teaspoonful to a Tablespoonful; not as a purgative, for which effect the *Simple* Syrup of Rhubarb is better; but to *correct* and *relieve diarrhœa,* especially when accompanied with *pain,* at an early stage.

Rochelle Salts: *Tartrate of Sodium and Potassium.* A not very disagreeable, moderately active, **purgative** medicine; one of the most convenient and suitable at the beginning of an inflammatory or febrile illness; such as *bronchitis, pneumonia, measles, scarlet fever, remittent fever,* etc. *Dose,* from a Teaspoonful to a Tablespoonful, dissolved in a fourth or a third part of a Tumblerful of Water.

Rubbing (massage). See later, under **Nursing**.

Salicylic Acid. This powerful medicine has been found, within a few years, to be very efficacious in relieving and shortening attacks of **inflammatory rheumatism.** It generally causes free perspiration and flow of saliva. In large doses it produces ringing in the ears, headache, and trembling; sometimes vomiting. Physicians prescribe it in doses of ten Grains or more, several times a day; but more often now the **Salicylate** of **Sodium** is given; from one to two Drachms in the course of twenty-four hours for a few days, and then smaller amounts until recovery of the patient. It is not a medicine adapted for domestic employment; but is sometimes used externally as an antiseptic by surgeons.

Santonin. One of the most effectual **vermifuges**; that is, medicines which either kill or drive out worms. It must be used with care, as excessive doses are violent in their action; we may say poisonous. For *lumbricoid* worms, the commonest kind, one Grain will be a dose for an adult; a quarter of a Grain, or less, for a child. For *seat-worms* (those small ones which inhabit the lower bowel, and cause annoying itching of the *anus* or outlet) **Suppositories** of Santonin are the best remedy. These are made of Cocoa Butter, with two or three Grains of *Santonin* in each; one being inserted into the bowel at bedtime.

Sassafras Pith. A very soft material, which gives a soothing (demulcent) property to Water in which it is placed. It is often used in this way for *inflammation of the eyes.*

Seidlitz Powders. Made by mixing Bicarbonate of Sodium, and Tartrate of Potassium and Sodium (Rochelle Salt), in powder together, for one paper. For another paper, Tartaric Acid is put up, in proportionate quantity. When administered, each powder is dissolved in Water, and the two Solutions are poured together. It is a mild but prompt **effervescing purgative**, much in use before the invention of the effervescing solution of Citrate of Magnesium. Each *saline* powder contains forty Grains of Bicarbonate of Sodium (soda) and two Drachms of Rochelle Salt. Each *Acid* powder consists of thirty-five Grains of Tartaric Acid.

Senna. The leaves of an Eastern plant; an active **purgative**, with a disposition to give some griping pain in its operation. This may be prevented by adding Fennel Seed (an *aromatic*) or Oil of Fennel to it when given. In my days of childhood, Senna Tea, in wineglassful draughts, was *the* domestic medicine for headache or a bad cold. We hated it much. Sometimes Epsom Salts was given instead, and that was a good deal worse. We would rather "creep unwillingly" to school than swallow either of them. My worst early experience of medicine, however, was in the country. The farmer's wife believed in "Thom-

sonianism." One day, for a cold, she kindly mixed for me a pint bowl-ful of "No. 6." After smelling and tasting it, I asked her to leave it for me to finish *by degrees*. The first and last degree, when her house-hold chores took her from the room, was right *out of the window*. I trust that most people have thrown Thomsonianism, with its hot red pepper draughts and hotter steam-baths, out of the window, a good while ago.

Fluid Extract of Senna is a neat and not very unpleasant preparation; with a drop of Oil of Fennel to each Ounce, it is a very good laxative for infants or older children. Fluid Extract of Spigelia and Senna has been mentioned already.

Slippery-Elm Bark has a **demulcent** property which makes it soothing to an inflamed or irritated part of the body; in *erysipelas*, for example. It is rather heavy to the stomach for internal use to advantage.

Soap. *Castile* Soap is the kind preferred when nicety is particularly desired. This is used by some people to clean their teeth. It is an ingredient, also, in some *purgative pills*, and is commonly employed for laxative *suppositories*, and to make warm *suds* for *opening injections*.

A lather of Soap, made as for shaving, and applied with a shaving-brush, is one of the most relieving applications for **itching**; for example, in poison-vine eruption, or other affections of the skin.

Soap Liniment. *Camphorated Tincture of Soap.* An excellent **bathing** material, so-called; that is, for rubbing a part, to warm and stimulate the movement of blood at and near the surface. It is good for sore-throat, sprains, etc., in this way.

Soda. *Bicarbonate of Sodium* is the chemical name of the article which is used in baking and washing, as well as in medicine. It is an excellent and not disagreeable **antacid**, relieving sourness of stomach, and often nausea (sickness of stomach) better than anything else. For such a use it may be taken, in small quantities. What would cover a little-finger nail, if it would hold it—a *pinch*, we may say—is an ordinary antacid dose, although twice as much may be taken for a single time. It is often prescribed by physicians for *gravel*.

Soda Water, or mineral water, has no soda in it, but is made by forcing into common Water Carbonic Acid Gas, given off by the Bicarbonate of Sodium in solution, upon the addition of an Acid to it, as Sulphuric or Chlorohydric Acid.

Chlorinated Soda is a liquid **disinfectant**, containing some free Chlorine gas. It is strong, a little going a great ways towards deodorizing foul vessels, etc. It will not do to pour it often into water-closets, on account of the Chlorine corroding the iron or lead pipes.

Spice-plasters. When a child's stomach is sick, or it is obstinately colicky, one of the most helpful things is a Spice-plaster. Take of Ginger, Cinnamon, and Cloves, all powdered, each one or two Teaspoonfuls; of Wheat Flour, the same amount. Mix all up together on a hot plate, with enough Whisky or Brandy to make a pasty mass. Spread this (not too thickly, on account of its weight) on a piece of thin flannel, with the edges turned in over it all round. When applied to the abdomen (it had better be large enough to cover the whole belly), it should have laid over it a piece of Oiled Silk, to prevent evaporation. Then it can stay on several hours, and, when dry, may be freshened up again by adding a little more Brandy or Whisky.

Like the Spice-plaster in action, is the application of a piece of flannel wet with *Essence of Ginger*, and covered with Oiled Silk. This will be somewhat more irritating to the skin of young and delicate children than the Spice-plaster.

Spiced Syrup of Rhubarb. Enough has been said of this under *Rhubarb;* which see.

Squills. The bulb of an onion-like plant, of which the *Syrup* is most used. It is an excellent cough-medicine (**expectorant**); rather less loosening than Ipecac., and therefore suited to a later stage in a bronchial attack. *Dose,* from a Half-teaspoonful to a Teaspoonful. This Syrup should be in every medicine-chest.

In Pill, Squill is often given as a **diuretic** (increasing the flow of urine). Dose for this use, one or two Grains, three times daily.

Staphysagria. Stavesacre. A drug used in powder as an effective *parasiticide;* especially to destroy the eggs or "nits" of lice.

Strychnia. The alkaloid principle of *Nux Vomica.* It is a deadly poison, in even so small a quantity as half a grain. One-sixteenth of a grain has killed a child three years old. A special effect of its poisonous action is, stiffening the muscles like lockjaw (tetanus). Of course it is not suitable to be kept and used as a family medicine.

Physicians prescribe Strychnia (or rather its *Sulphate*), especially for certain cases of **Paralysis** (palsy). Also, in *very* small dose, it is a powerful general **tonic** to the nervous system in prolonged debility. *Dose,* from one-thirtieth to one-twentieth of a Grain; sometimes cautiously increased. *Extreme restlessness* is a sign of its having an excessive effect upon the nervous system.

Sublimate, Corrosive. A very powerful poison; the *Bichloride of Mercury.* The most frequent family use of it is to kill bedbugs; painting or squirting a strong solution of it in and over cracks and holes in bedsteads, etc. It must not be kept in the medicine-chest, for fear of accidents.

Physicians value Corrosive Sublimate for its **antiseptic** property; arresting putrefactive decay, and destroying "germs" of every kind, some of which are supposed to produce diseases. It is, for this effect, employed as a *wash*, one part to a thousand of Water for the skin, and one part to two thousand for the vagina, etc. It is also given internally, sometimes, in *syphilis;* and latterly, attention has been drawn to its apparent usefulness in *diphtheria*. *Dose*, from one-eighth to one-half a Grain, twice daily, under medical advice.

Sulphide of Calcium, in quarter-grain doses or less, has the confidence of many physicians as a remedy for *boils*, when one boil keeps following another. A fresh-made solution, of one Grain in a Pint of water will answer; two Teaspoonfuls being taken every hour or two for a few days at a time.

Sulphites and **Hyposulphites.** These are "salts" or compounds of *Sulphurous* (not Sulphuric) Acid. Their power to arrest or prevent fermentation has suggested their employment as medicines in what have been called "zymotic" diseases; but the results have been, on the whole, less beneficial than was expected. *Sulphite of Sodium*, in doses of from five to fifteen grains, does good in some cases of indigestion, and perhaps in some of boils or carbuncles.

Sulphur. Brimstone, the popular name of this, is a corruption of *burnstone;* given on account of its combustibility. It is a mild and good **laxative**; particularly suitable for **piles**, and for those persons who are often troubled with **colic**. *Dose*, a Teaspoonful; in molasses or milk. In recent cases of *skin-disease*, it is often given with an equal quantity of *Cream of Tartar*.

Externally, Sulphur is *the* specific remedy for **itch**; not the only one, but the most convenient and frequently used. It is applied in the form of *ointment*, rubbed well into the seat of the eruption, where it kills the *acarus* or itch-mite, which keeps up the disease.

Sulphur, when burned, gives off fumes of *Sulphurous Acid*, which is a potent **disinfectant.** A pound or two of it burned in a large room (with all the people out of it, of course, as the gas cannot be breathed), with the doors and windows closed for two or three hours, will do more to purify it of any contagion or infection than anything else that can be done.

Sulphuric Acid. Oil of Vitriol is the commercial name for this very strong acid. It burns (corrodes) any part of the body which it touches; being destructive of organic matter by means of its intense affinity for water. When swallowed, it is a terrible poison. A boy under my care as a patient drank a mouthful of it by mistake, and very narrowly escaped death in consequence. His throat, including the

upper part of the windpipe, was so burned that he could scarcely breathe or swallow for three or four days.

Pure Sulphuric Acid is not used in medicine. *Aromatic* Sulphuric Acid is the *Elixir of Vitriol*. This is a good **appetizer** in ten- or twelve-Drop doses, in water. It is also sometimes given for *diarrhœa;* and has some reputation as one of the remedies for *epidemic cholera*. A drink made of it is recommended to workers in lead or lead paint, to prevent the poisonous action of that metal; as the Sulphate of Lead (compound of Lead with Sulphuric Acid) is insoluble in water, and without much if any poisonous influence upon the body.

Suppositories are small, soft solids, made for introduction into the lower bowel. Brown Soap is sometimes so used instead of an opening injection (enema). A piece of it or of Castile Soap may be cut of about the size and shape of the last joint of the little finger, and dipped in Oil (Castor-Oil or Sweet-Oil) for easy introduction. It must be pressed upwards gently until fully within the bowel, and retained for a little while by the contraction of the muscle at the outlet (*sphincter ani* muscle of anatomists).

Cocoa (*Cacao*) *Butter* is a very common and convenient material for suppositories, with which are mixed medicinal agents so to be used. *Opium* may be thus employed, the dose being twice as large as when taken by the mouth. A suppository may therefore contain two Grains of Opium. *Santonin* suppositories (with three Grains of this drug in each) may be used with great advantage for *seat-worms*.

Tannin or Tannic Acid. This is the **astringent** principle of Oak Bark, of Nut Galls, and of many other vegetable materials. Its presence in Tea-leaves accounts for iron spoons being blackened when left in Tea. Catechu and other vegetable astringent medicines contain Tannic Acid, some of them also the very similar Gallic Acid.

Tannin is often given as a medicine in pill for *diarrhœa* and for *hemorrhages.* A good astringent pill is made with three Grains of Tannin and a little Opium, from one-twelfth to one-half a Grain of the latter, according to the case.

Tannin is also frequently made part of an astringent *gargle*, particularly in rather *chronic* (prolonged) cases of sore throat.

Tar. An old-time remedy for *chronic bronchial* trouble; especially likely to do good by *inhalation.* A tin cup containing Tar may be kept over a slow flame, in the room with the invalid, so as to give off Tar vapor into the air. A good way is to have the cup of Tar in a vessel of hot Water; the heat acting upon the Water, so that it never heats the Tar so much as to decompose it. Or it may be used with a simple inhaler. (See **Inhalation.**)

Tar Ointment is a valuable preparation in some *skin diseases.* It will generally cure *ringworm.* For this purpose, it should be rubbed gently but thoroughly over the ringworm at night (the part being, if practicable, then covered with a soft light rag, over which is oiled silk), and cleaned off carefully with warm water and Castile Soap in the morning.

Taraxacum. Everybody knows the Dandelion plant (Dent-de-lion, French, for lion's tooth, from the form of the leaf). *Taraxacum Dens-leonis* is its botanical name. The leaves are liked by some people as a kind of "greens" for the table. The root has long been known, when chewed or drunk in the form of a tea, to act upon the kidneys, increasing the flow of water. Besides this **diuretic** action, it appears also to aid in relieving torpor of the **liver.**

Extract of Taraxacum is the most convenient preparation. In ten- or twenty-Grain doses it may be taken by those who have symptoms threatening bilious colic, or who, from nausea, dizziness, a bitter taste, and yellow eyes and tongue, appear to suffer from imperfect removal of bile from the system. It is thus a mild and safe assistant to, or perhaps substitute for, Blue Mass.

Tarrant's Powders. A moderately active and not unpleasant cooling purgative. Dose, from a Teaspoonful to a Tablespoonful, according to the amount of effect desired.

Tartar Emetic. A very harsh drug in its effects upon the human body, unless it be given in very small doses. Other emetics are always

to be preferred when vomiting is to be produced. Its greatest value is in small doses as a **sedative** and **expectorant** in highly inflammatory cases of **pneumonia** or acute **bronchitis.** Once, in these affections, and in pleurisy, it was given (first in Italy) in one-Grain doses. This practice is not now followed. From one-sixteenth to one-fourth of a Grain for an adult will be enough, every two or three hours. For children, Tartar Emetic is too prostrating to be used unless for quite exceptional reasons. Coxe's Hive Syrup, formerly a common medicine for croup, should be excluded from the family medicine-chest, on account of its containing Tartar Emetic. *Antimonial Wine* is open to the same objection; *Wine of Ipecac.* is similar in effect, but much safer.

Tartar Emetic *Ointment* is occasionally employed as a powerful **counter-irritant**, applied to the chest or spine. It causes a sore pustular eruption, more severe even than that made by Croton Oil used in the same way.

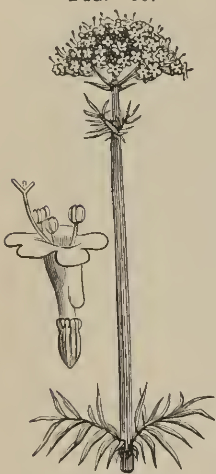
Tobacco. Boys with their "first cigar" find out the sickening and depressing action of this narcotic weed. Under **Hygiene** we have discussed its injurious effects as an indulgence, whether smoked or chewed. Country people sometimes relieve *spasmodic croup* by laying upon the throat and chest of the child a Tobacco leaf, sprinkled with hot water or whisky to bring out its strength. If left on long in this way, it is said in a few instances to have had enough *nicotin* absorbed through the child's skin to cause death. Physicians now and then inject a solution of Tobacco into the bowels to relax the muscles for the reduction of a *strangulated hernia.* (See **Rupture**, hereafter.)

Turpentine, Oil or **Spirit** of. Used occasionally by physicians as a medicine internally, in ten-drop doses, in *typhoid fever* (as an alterative to the diseased bowel), and in *chronic rheumatism;* in larger quantities, even a teaspoonful or more, in cases of *tapeworm*, and as an antidote for *phosphorus poisoning.* Oil of Turpentine is a very heating, stimulating article, and had better not be taken internally without medical advice. It excites the kidneys, although not always producing an increased flow of urine.

Externally, it is a good warming application (half and half with sweet oil, if the skin of the patient be delicate) for *sore throat*, pain in the *side* or *back*, etc. It may cause some soreness and a slight eruption, which, however, will soon pass away.

Valerian. The root of an herb native to the Old World, of which the *Tincture* and *Fluid Extract* are most used. It is a mild **nervous stimulant** and **antispasmodic** (composing agent). In *hysterical* cases, and in some cases of *delirium tremens,* it is very serviceable. *Dose* of the Tincture, a Teaspoonful; of the Fluid Extract, the same; either being diluted with Water when taken.

FIG. 199.



VALERIAN.

Valerianate of Ammonia is often given, in the form of an *Elixir,* in teaspoonful doses, to promote sleep in cases of restlessness at night. **Valerianate of Zinc** is a **nerve-tonic**; sometimes prescribed by physicians, in one-Grain doses, for *epilepsy.*

Veratria. A vegetable alkaloid of great power to affect the nervous system. Like Aconite, when applied to a part it causes a prickling sensation and numbness. In the strength of twenty Grains to an Ounce of Lard, it makes an ointment which may be applied to the seat of pain in *severe neuralgia.* It is rarely given internally as a medicine.

Veratrum Viride (American Hellebore). A very powerful **sedative**; too much so for domestic practice, without medical advice. It is given by physicians in inflammatory febrile attacks, and also in the prolonged over-action of the heart and blood-vessels belonging to *exophthalmic goitre* and *aneurism of the aorta* (which see). *Dose,* from three to six Drops every three or four hours; the effect being closely watched, lest, with nausea and vomiting, it produce dangerous prostration.

Vichy Water. An alkaline (antacid) Mineral Water of France, more agreeable because of its containing some free Carbonic Acid gas. It is recommended for *dyspepsia* with sour stomach; for *gravel,* and for *gout;* especially when the last named affects the stomach and digestion. *Vichy lozenges* are sold by apothecaries, being intended to imitate Vichy Water when dissolved. They are often found serviceable to persons subject to sourness of stomach after eating.

Warner's Cordial. *Tincture of Rhubarb and Senna* this is, by composition. It is a warming, **stimulating laxative** to the bowels; good in *gouty* cases, and many others. *Dose,* one or two Teaspoonfuls, in water.

Watermelon-Seed Tea is an old remedy for dropsy. It is a **diuretic,** of considerable power, and quite safe, if it does not always cure. A couple of Tablespoonfuls of the seeds may be infused in a Pint of hot water, and left covered for an hour or two. It is least disagreeable when taken cold; *dose,* a Wineglassful (or less, if the stomach be weak) three or four times a day.

Wild Cherry Bark. One of our native American medicines, of real value. Like the fruit and leaves of the Wild Cherry tree, and like Peach leaves and fruit-stones, this bark contains principles which, when water is added, make a small quantity of Prussic (Cyanohydric or Hydrocyanic) Acid. This is a decided **sedative** to the blood-circulation, while Wild Cherry Bark has also somewhat of the **tonic** property which is more largely possessed by the vegetable *bitters.* It is, therefore, a *Sedative tonic.* It is adapted to cases of *bronchial* inflammation, especially in rather feeble persons. I have known it to do good even in *consumption of the lungs.* A *cold infusion* (tea) may be made by soaking pieces of the Bark in cold water over night. This may be drunk freely, so long as the stomach is not oppressed by it. But more convenient are the *Syrup* and *Fluid Extract* of Wild Cherry Bark. The *Syrup* is an excellent cough-medicine, at any stage of a cough, having a particularly soothing and quieting influence upon the air-passages. It may be taken at first with Syrup of Ipecac., to loosen the cough; then with Syrup of Squills, to hasten the cure; and afterward, if need be, when it is well loosened and yet troublesome, with a little Paregoric also. *Dose,* a Teaspoonful. Much more at a time will sicken some persons.

Fluid Extract of Wild Cherry Bark is more of a simple appetizing tonic, for general debility. *Dose,* a Teaspoonful, thrice daily.

Wistar's Lozenges. These are made of Liquorice, Gum-Arabic, Sugar, Oil of Anise, and a little Opium. They are very quieting to a cough, but, as Opium tends to check expectoration, they are not suitable for the *early, tight* stage; their time is when cough is *loosened* thoroughly, but is annoying and interferes with sleep at night. From one to four Lozenges may be dissolved slowly in the mouth in the course of a night if required.

Many more drugs might be here named, and their properties and uses described. But I think it best to confine our attention to those best tried and known to the medical profession. Others may be read about in medical works.

DOSES OF PRINCIPAL MEDICINES.

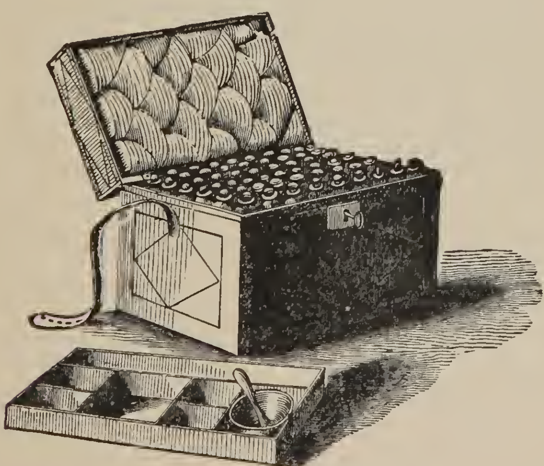
Acetate of Ammonium Solution	1 Tablespoonful.
Aromatic Spirit of Ammonia .	10 to 30 Drops.
Assafœtida, in Pill . . .	3 to 5 Grains.
Assafœtida, Milk . . .	Teaspoonful to Tablespoonful.
Blue Pill	$\frac{1}{4}$ Grain to 3 Grains.
Bromide of Potassium or Sodium	5 to 20 Grains.
Cajuput Oil	4 to 8 Drops.
Calomel	$\frac{1}{12}$ Grain to 2 or 3 Grains.
Camphor, Spirit . . .	10 to 30 Drops.
Camphor Water . . .	Teaspoonful to Tablespoonful.
Cardamom, Compound Tincture	1 Teaspoonful.
Castor-Oil	Teaspoonful to Tablespoonful.
Catechu, Tincture . . .	Half-Teaspoonful to Tablespoonful.
Cathartic Pills, Compound .	1 Pill.
Chalk Mixture . . .	Teaspoonful to Tablespoonful.
Chloral Hydrate . . .	5 to 30 Grains.
Chlorate of Potassium . .	5 to 20 Grains.
Chloride of Ammonium (Muriate of Ammonia) . . .	5 to 20 Grains.
Chloroform, *internally* . .	5 to 50 Drops.
Cinchonia, Sulphate . .	2 to 3 Grains.
Citrate of Magnesium, Solution	1 or 2 Wineglassfuls.
Citrate of Magnesium, Granulated	Teaspoonful to Tablespoonful.
Cod-Liver Oil . . .	1 Tablespoonful.
Colchicum, Wine of Root .	10 to 20 Drops.
Cream of Tartar . . .	Teaspoonful to Tablespoonful.
Creasote	1 Drop.
Croton Oil, internally . .	$\frac{1}{4}$ Drop.
Digitalis, Tincture . . .	10 to 15 Drops.
Dover's Powders . . .	10 Grains, at night.
Elaterium	$\frac{1}{16}$ of a Grain.
Elixir of Vitriol . . .	10 to 15 Drops.
Elixir Proprietatis . . .	1 or 2 Teaspoonfuls.
Epsom Salts	Teaspoonful to Tablespoonful.
Ergot, Wine of . . .	Half Teaspoonful to 2 Teaspoonfuls.

Gentian, Compound Tincture .	1 or 2 Teaspoonfuls.
Ginger, Essence of . . .	10 to 30 Drops.
Glycerin, internally . .	1 or 2 Teaspoonfuls.
Hoffmann's Anodyne . .	1 or 2 Teaspoonfuls.
Hops, Tincture of . . .	1 or 2 Teaspoonfuls.
Hunyadi Janos Water . .	1 Wineglassful.
Huxham's Tincture . .	1 Teaspoonful.
Iodide of Potassium . .	5 to 10 Grains.
Iodine, Lugol's Solution . .	10 to 15 Drops.
Iodoform, internally . .	1 Grain.
Ipecacuanha, Syrup or Wine .	10 Drops to 1 Teaspoonful.
Iron, Pill of Carbonate (Vallet's)	3 to 5 Grains.
Iron, Tincture of Chloride .	10 to 20 Drops.
Jalap	5 to 10 Grains.
Lactucarium, Syrup . .	1 or 2 Teaspoonfuls.
Laudanum	10 to 30 Drops.
Lavender, Compound Spirit .	1 or 2 Teaspoonfuls.
Lime-water	Dessertspoonful to Tablespoonful.
Lobelia, Tincture . . .	20 Drops to a Teaspoonful.
Lupulin, Tincture of . .	1 or 2 Teaspoonfuls.
Magnesia, Calcined . .	1 Teaspoonful.
Morphia, Magendie's Solution	4 or 5 Drops.
Morphia, Solution . . .	1 Teaspoonful.
Musk	3 to 5 Grains.
Nux Vomica, Extract . .	$\frac{1}{4}$ to $\frac{1}{2}$ Grain.
Nux Vomica, Tincture . .	10 to 20 Drops.
Opium	1 Grain.
Paregoric	1 Teaspoonful.
Peppermint, Essence . .	1 to 10 Drops.
Permanganate of Potassium, internally	1 or 2 Grains.
Pink Root, Fluid Extract .	1 Teaspoonful.
Pink Root and Senna, Extract	1 Teaspoonful.
Podophyllin	$\frac{1}{4}$ Grain.
Püllna Water . . .	1 Tablespoonful.

Quinine	1 or 2 Grains.
Rochelle Salt. . . .	Teaspoonful to Tablespoonful.
Rhubarb, in Pill . . .	3 to 5 Grains.
Rhubarb, Simple Syrup . .	Teaspoonful to Tablespoonful.
Rhubarb, Spiced Syrup . .	Teaspoonful to Tablespoonful.
Santonin	1 to 3 Grains.
Senna, Fluid Extract . .	Teaspoonful to Tablespoonful.
Soda, Bicarbonate . . .	2 to 20 Grains.
Squills, Syrup . . .	Half Teaspoonful to Teaspoonful.
Tannic Acid	3 Grains.
Taraxacum, Extract . .	10 to 20 Grains.
Tarrant's Powders . . .	Teaspoonful to Tablespoonful.
Veratrum Viride, Tincture .	3 to 6 Drops.
Warner's Cordial . . .	1 or 2 Teaspoonfuls.
Wild Cherry Bark, Syrup .	1 Teaspoonful.
Wild Cherry Bark, Fluid Extract	1 Teaspoonful.

[On *Administration of Medicines*, see NURSING.]

FIG. 200.



MEDICINE CHEST.

HOUSEHOLD MEDICINES.

From the author's "Family Adviser and Guide to the Medicine Chest" is taken the following list of the most useful and desirable remedies needed. They may be adapted for every size of Medicine Chest, whether for Plantations, Ships, Families, or Travellers:

Liquids in Bottles.

Castor-Oil,
Essence of Ginger,
Laudanum,
Paregoric,
Spirits of Hartshorn,
Spirits of Camphor,
Sweet Spirits of Nitre,
Hoffmann's Anodyne,
Tincture of Arnica,
Soap Liniment,
Syrup of Squills,
Aromatic Syrup of Rhubarb,
Simple Syrup of Rhubarb,
Compound Spirits of Lavender,
Chloroform Liniment,
Syrup of Ipecacuanha,
Tincture of Chloride of Iron,
Fluid Extract of Valerian,
Chalk Mixture,
Solution of Persulphate of Iron,
Washed Ether,
Aromatic Spirits of Hartshorn,
Collodion,
Diarrhœa and Cholera Mixture,
Wine of Ipecacuanha,
Wine of Ergot,
Wine of Colchicum,
Essence of Peppermint,
Glycerin,
Tincture of Myrrh,
Tincture of Catechu,
Warner's Cordial,
Tincture of Aloes and Myrrh,
Fluid Extract of Spigelia and Senna,
Tincture of Lobelia,
Aromatic Sulphuric Acid,
Syrup of Senega,
Tincture of Capsicum,
Chloroform,
Spirits of Turpentine.

Pills, Powders, Etc.,

From which selections can be made and adapted to any of the Chests furnished by druggists.

PILLS.

Rhubarb Pills,
Compound Cathartic Pills,
Blue Pills,
Compound Gentian Pills,
Tannin and Opium Pills,
Quinine Pills,
Opium Pills, 1 gr.,
Assafœtida Pills, 3 gr.,
Lady Webster's Pills.

POWDERS.

Alum,
Borax,
Chlorate of Potash,
Cream of Tartar,
Sugar of Lead,

Husband's Magnesia,
Tarrant's Aperient,
Bicarbonate of Sodium,
Citrate of Potassium,
Gum-Arabic,
Rochelle Salts,
Calomel, 1 gr.,
Dover's, 10 gr.

SUNDRIES.

Opium Suppositories, 2 gr.,
Santonin Suppositories, 3 gr.,
Santonin Dragees,
Wistar's Cough Lozenges,
Simple Cerate,
Cold Cream,
Blistering Cerate,
Cocoa Butter,
Camphor Tablet,
Adhesive Plaster,
Court Plaster,
Camel-Hair Pencils,
Lint,
Oiled Silk,
Enema Syringe,
Scales and Weights,
Mortar and Pestle,
Spatulas,
Bandages,
Tweezers,
Medicine Measure,
Scissors,
Castile Soap,
Sponge,
Thread,
Cork-Screws,
Lancet,
Wax,
Eye-Glass,
Ear Syringe.

Medicine Chest, No. 1.*

Containing 28 Bottles—10 four-ounce, 12 two-ounce, and 6 half-ounce. With Drawers, Jars, etc. Price, $30.

Castor-Oil,
Essence of Ginger,
Spiced Syrup of Rhubarb,
Simple Syrup of Rhubarb,
Camphor-water,
Lime-water,
Cinnamon-water,
Paregoric,
Spirits of Camphor,
Spirits of Hartshorn,
Laudanum,
Syrup of Ipecacuanha,
Syrup of Squills,
Sweet Spirits of Nitre,
Hoffmann's Anodyne,
Chalk Mixture Powder,
Compound Spirits of Lavender,
Anodyne Carminative (Cholera Mixture,)
Tincture of Arnica,
Soap Liniment,
Essence of Peppermint,
Spirits of Turpentine,
Collodion,
Aromatic Spirits of Ammonia,
Tincture of Capsicum,
Aromatic Sulphuric Acid,
Wine of Colchicum,
Glycerin.

* Sold by John Wyeth & Bro., 1412 Walnut Street, Philada.

PART III.

NURSING.

IN many kinds of illness, especially continued fevers, and other attacks attended by great debility, good nursing is well known to be as important as good doctoring. A careful physician will direct not only the medicines of the patient, but also his food, and all other matters concerning him—as his covering, changes of clothing, air in his room, etc. But the carrying out of such directions must be left to those immediately in charge of the sick person from hour to hour; and questions will occur in the doctor's absence, sometimes of much importance, which those who nurse the patient must answer and act upon at the moment, from their own knowledge. Moreover, the *manner* of doing things in the care of a sick person makes an immense difference in his comfort. In critical cases it may even decide between recovery and death.

What are the qualities that make a good nurse? They are **kindness, good common sense, carefulness, quietness, neatness, handiness, cheerfulness.**

Kind a nurse must be, or mere professional skill and obligation will fail to effect all that is needed for the best welfare of a patient. Sympathy is worth much to a sufferer. It is to the mind what warmth is to the body; and the absence of it, shown in face and manner, will act like a draught of cold, damp air or a wet blanket. *Patience* is often called for in attendance upon the sick, and selfish people do not have a large stock of this, which can be bought with money; it must come from love, or, at least, from genuine kindness of heart.

Common sense, that is, intelligence such as most people, not particularly deficient, possess, will enable any one to *learn* what is necessary in nursing, and to do it respectably, at least. Of course, really superior intelligence is a very good thing in nursing; and will bring the best results in this, as in anything else. But most people can become good nurses, if they *try*, with the help and advice of those who have had experience.

Carefulness is indispensable. One who will give a dose of medicine without looking at the label on the bottle; or will spill out twenty drops when ten were ordered; or will upset a breakfast tray on the bed; or leave a vessel under the bed for hours uncovered; or sleep six hours when the patient should have food or medicine every two hours; or let the fire go out when the room without it is cold; such an one is entirely unfit to have charge of a sick person under any circumstances.

Exactness in carrying out the orders of the physician is the *first duty* of a nurse. The doctor is responsible for the treatment of the case, and the patient and family are responsible for the choice of the doctor. He is chosen because he is believed to have the knowledge and skill required. If the family thought they knew enough to manage the illness, they would not send for the doctor. When they have sent for him, it is wise and right to accept and carry out his orders. The nurse, whether man or woman, who thinks he or she "knows better than the doctor," is a very dangerous and unsuitable person to have about the house.

Sleeping heavily is a weakness from which some suffer when in care of ill patients at night. It is a good thing to learn to wake with a sound or a touch. By fixing it strongly on the mind, most people can do this. It is best, however, for those who are nursing to arrange to be relieved at certain hours, when they can be best done without, so as to *get enough sleep,* whenever possible, in every twenty-four hours. To oblige the same person to be at the bedside of an ill person day and night, for weeks together, is not only cruel to the one so overtasked, but it risks unfitting the nurse for good service. A break-down may come, just at a critical moment, and then the family is left under a calamity which might have been prevented by proper consideration from the start. It is wonderful how thoughtless some people are about such things.

Watchfulness in everything is the duty of a nurse. Without it, a patient may get out of bed in a delirium, and perhaps fall down stairs or out of the window. Or, the clothing may be thrown off, and a deadly chill will follow. Or the time for food may pass by, and nothing is ready; so that exhaustion comes, and all the symptoms are worse in consequence. In a thousand things the life of the sufferer may be in the hands of the nurse, as the safety of the passengers and cargo of a ship is in that of the pilot at the helm. (If, as we have suggested on a previous page, the doctor is the captain, the place of steersman may well be given to the nurse.)

When many doses of medicine or portions of food have to be given through the day and night, it is best that the times and quantities shall

be *written down*, instead of trusting to memory. And then, a mark or record of some kind being made when each thing *is* given, this makes ready a report of the treatment for the doctor to see when he comes.

Quietness is very necessary in the sick-room. Stamping around in heavy or creaking shoes, talking in a loud voice or loud laughter, swinging in a rocking-chair, slamming doors or windows, or even much rustling of garments; *all noises* are utterly inadmissible and injurious. Yet *whispering*, and creeping on tiptoe in sight of the patient, are about as bad, because they attract his attention unpleasantly, and that is always to be avoided. Slippers or soft shoes should always be worn, and a wrapper or something that does not rustle. Rattling of spoons or dishes also must be prevented. Nothing should ever be cooked or washed in the sick-chamber. If coal is to be put on the fire, let it be wrapped in paper outside of the chamber, and put, paper and all, into the grate or stove.

Never ask a patient whether he would "like to eat or drink" such-and-such a thing. Prepare and bring, under the directions of the doctor, what will be best and most likely to be taken, and offer it quietly. If not taken in a little while, remove it out of sight. *Keep no food or medicine in sight of a sick person.* The next room, or an entry near, may often be convenient for such things. When one room only is available, find a place out of his sight for them, or put up something as a screen to conceal them.

Neatness is a very similar quality to quietness. Nothing should be allowed to be slovenly, much less dirty, around a sick person. Yet "fuss" and much movement in clearing up are to be avoided. A wet cloth will be better than a brush or broom in cleaning furniture and carpet (if there be a carpet, of which something presently). When the restlessness of a patient puts all his bedclothes out of order, gently straighten them up again; not for his comfort of body only, but for the mental impression going with it.

Handiness is an excellent quality in doing all sorts of things, in the sick-room, as well as everywhere else. While it is not absolutely indispensable, its opposite, clumsiness or awkwardness, may cause much discomfort. I have known one or two men who, in a surgical ward of a hospital, could hardly go near to a patient without somehow hurting him. Such persons as are naturally and unavoidably clumsy had better be called upon to do *outside* errands rather than bodily service immediately about the sick. Great kindness, however, will often conquer this infirmity. Very seldom will a mother handle her baby so clumsily as to hurt it; although examples have occurred of their "overlying" them, that is, turning over upon them and smothering them while asleep beside them in bed.

Cheerfulness is an excellent attribute in the sick-room. It is as pleasant as sunshine, and wholesome like it, without any of its glare. A long face or a whining voice should never enter where there is suffering enough already. Let every one endeavor to make the best of all things, and the most of hope. Should we *lie* to patients, then, and tell them they are getting well, when they are about to die? I have known one physician who had the very bad habit of doing this. It is morally wrong, and inexcusable. It only causes the worse shock when the truth makes itself known. But *hope* is to be encouraged. When there is doubt, leaning toward the brighter side is well; and, as the proverb says, "while there is life there is hope."

Speaking of a patient's symptoms in his presence (unless when needful questions have to be asked) is to be avoided. Also, there must be no discussion or mention there of other people's illnesses or deaths. *Much talking of any kind* is out of place in the sick-chamber; it interferes with that *rest of brain* which, in all kinds of illness, is important.

So far, we have been considering the *qualities* requisite to adapt any one for the duty of nursing. Now we may look at the particular *needs of the sick*, on their side, which have to be attended to by those in charge of them. These concern the *room*, its *warmth*, *light*, and *air;* the *bed*, its *pillows* and *covering*, and the patient's *clothing* next his person; his *washing* or *bathing;* his *food*, *medicine*, *excretions*, *sleep*, and *mental management*. *Rubbing*, and the management of *child-birth*, will also afterwards receive our attention.

THE SICK-ROOM.

When it is possible to choose, the room should be on the sunny side of the house, and on the second floor. It should be as large as can be; that is, as chambers are in most dwelling-houses. There will be no advantage in its being more than twenty or thirty feet square, with twelve to fifteen feet of height to the ceiling. If a room is necessarily small, more contrivance will be required to meet all the conditions wanted in the care of an ill person.

Plenty of large windows are desirable in a sick-room. Should there unfortunately be only one window, it will be almost impossible to air the room properly, unless there be an open transom over the door, or the door be left open most of the time. When two rooms communicate, one of them may with advantage be given up to the patient, and the other to the nurse and to various appliances, which may thus be kept out of the sick one's sight.

But little furniture should be in the sick-room. A few chairs and tables will suffice, one being a bedside table for frequent use. A bed-chair (night-chair) or portable earth-closet will be very serviceable for a patient who is strong enough to get or be helped out of bed. No carpet should be on the floor, except movable pieces or rugs, placed where they are needed for warmth to the feet and to prevent noise in moving about.

No bed-curtains should be allowed; nor heavy window-curtains. Good blinds or shades are needful to regulate the admission or exclusion of light.

Warmth.

A sick-room should, generally, be kept at a temperature between 68° and 70° Fahr. In a few exceptional cases, physicians may wish to have a room much warmer, at particular times. When fuel is scarce, and the room is small, it will be best to secure good air to breathe, even at the loss of some degrees of temperature in the room; this being made up by sufficient covering for the patient. But, in most instances, air may be, with care, kept pure and sufficiently warm at the same time.

The best kind of fire for a sick-room is an open wood fire in the chimney-place. Next to that is an open coal-grate, with a *good draught* to secure it from escape of gas. If only a stove can be had, a wood-burning stove should be preferred. With a stove which burns coal, the greatest care will be necessary to prevent coal-gas from getting out into the room, and also to keep the air moist enough by having water in a pan always upon the stove.

Furnace-heated air is objectionable as a dependence in a sick-room, although very well to have within reach to supplement an open fire. The warmth of most furnaces is variable and uncertain; some of them allow gas to get into their air-chambers, and so to pass through the house; and, at the best, they require special pains to provide ventilation, which the heater itself does not furnish.

For the body of a sick patient to be kept *warm enough* to be comfortable, is one of the quite indispensable things. It should be ascertained from time to time, especially about the feet. Blankets and quilts will not always insure warmth; they only protect it when the body has it of itself. *Whenever a sick person's feet are cold, something warm should be at once put to them.* A heated fire-stone, or a common brick, or a bottle, or pan of hot water, or a bag of hot salt, will do. Only never let your patient be *chilled*, for a single minute, when it can be helped.

LIGHT.

While the sunny side of the house is the best, and sunlight should be admitted (with few exceptions only) every day into the room, the sick person's eyes should not be exposed to a direct glare. The bed may be so turned that the window is out of the patient's sight; or, if this cannot be, a screen of some kind should be so placed as to shield his eyes from it. At times, when sleep is desirable, the light should be almost all shut out. At night, no flame of a lamp, candle, or gas-burner should be exposed to the patient's view. Either should be shaded, or otherwise concealed. A gas-burner may, of course, be turned down; and, besides, a movable tin burner-shade attached to it is a great convenience. Some persons, even when well, cannot sleep with the flame of ever so low-turned a gas-burner in their sight. It is not safe, moreover, to turn a gas-burner very low. A change of pressure at the source of supply may put out the light, and allow a leakage of gas, dangerous to any one sleeping in the room.

AIR.

Under **Hygiene**, the principles of ventilation have been fully discussed. In the sick-room, the things to be done are, to have the air changed constantly, and at the same time to prevent direct draughts upon the patient's bed. If there are several windows, all but the one nearest the bed may be open a *little* at top and a *little* at bottom; more or less according to the weather. In really *warm* weather, of course, everything may be opened wide all the time.

With only one window in a room, as already said, there ought to be another outlet for air, such as a transom over a door; or, in the absence

of this, the door itself may be left open. This will require attention to the air of the room, or passage, communicating by that door with the room. If the air of the house is foul, that will hurt the condition of the siek-room, when the door of the latter is left open. Yet, somehow, *both* an *inlet* and an *outlet* are needed, to change the air of the room.

In very cold weather, when it is impossible safely to have (as is always best) a constant and considerable movement of air through the room, the next best thing will be to have chosen *times* of airing it thoroughly. Cover the patient with extra blankets or coverlids, protecting even the head and face for the time; and then open the window or windows and doors wide *for a few minutes*. Upon closing them, see that the patient keeps his extra cover until the room is warm enough again.

Few people appreciate the value of *pure air* for the sick. During the Civil War, it was found that wounded soldiers, and those ill with fever, did better in the *tent* hospitals, or even out on the open field (where sometimes, after a battle, they were unavoidably left for two or three days), than in the close wards of an ordinary hospital in a town. I remember two patients suffering with inflammation of the lungs, one of them a lady more than eighty years of age, who felt the need of pure cold air so much, that they insisted on having the windows in their rooms open all the time, though the thermometer stood at several degrees below the freezing-point.

THE SICK-BED.

What will be best? A wide and rather low bedstead, for ease in getting in and out; a wire bed-bottom; next best to it, one on good springs, with a thick but soft mattress; if it be a *slat* bedstead, then with a feather bed upon the slats under the mattress. No curtains should be placed around the bed. Why? Because they check the free and abundant supply of air to the patient. If the bed were out of doors, in winter, curtains might be endurable. They were, no doubt, invented when houses were almost as cold as out-of-doors.

Pillows should be of full size, and as soft as possible. Extra little pillows are often useful, to put in spaces, in propping a patient up, or to relieve some particular pressure. A sheet, as a rule, not a blanket, should be next to the body. The blanket first is only proper when the patient is very hard to keep warm, or when one quite ill is lifted into and out of a bath. A down quilt is the nicest top-piece; its lightness is a great advantage. Some patients can hardly bear the pressure of the bedclothes. Over an inflamed or injured limb, it is often necessary to put a support to keep them off. This may be made by breaking a barrel-hoop in two, and placing the pieces across each other (fastened at the middle for steadiness) under the clothes.

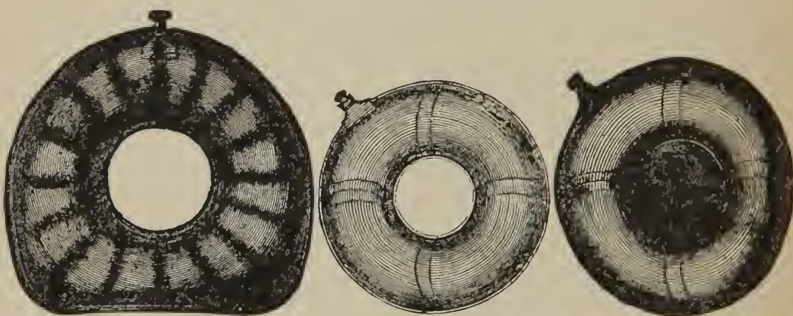
Changing the bedclothes requires care, but it ought to be done often. When there is likely to be anything to soil the bed, a large piece of rubber-cloth or oil-cloth should be put upon the mattress, beneath the under sheet. In cases of labor, a second rubber- or oil-cloth had better be placed upon the lower sheet, and another sheet over it, so that the latter and the upper rubber-cloth may be removed, leaving the bed still protected.

Sheets, especially, ought to be changed often. When practicable, once in twenty-four hours will be desirable in a severe illness. To make the change, warm a sheet thoroughly (being sure first that it is *entirely dry;* a damp sheet may be deadly), and fold it, lengthwise. Then fold, also lengthwise, one side of the under-sheet on the bed, up against the patient's side. Push the fresh-warmed sheet along near him, and have some one to lift, first his head and shoulders, and afterwards his legs and feet. Then, while he is lifted, press the soiled sheet from under and beyond him, and roll out the fresh one (half of it) to take its place. It will then be easy to draw it smooth. To change the upper sheet, the fresh one, being first warmed, may be rolled either in its width or in its length, and passed *under* the sheet already over the

patient's body, into its place, without disturbing him at all. It requires two persons, one on each side of the bed, to do this well.

Bedsores are very troublesome occasional results of continued pressure, while one is lying long in bed; they are especially apt to occur in very *thin* and weak persons. Most of all they are liable to happen when, from an injury or serious disease of some part, the patient cannot change his position from time to time. This is the case with fractures of the thigh or leg. In such instances the utmost care must be taken to preserve the soundness of the skin where it is most pressed upon. It must be examined every day, and bathed gently with whisky or soap liniment. When redness and tenderness of the skin begin to

FIG. 201.



AIR- OR WATER-CUSHIONS.

appear, a *protection* to it must be supplied, by covering the part with a piece of soft, thick buckskin, upon which *soap-plaster* has been smoothly spread; or, if that is not at hand, two layers of adhesive plaster, very *smoothly adjusted* to the surface, will do for the purpose. Small pillows, or air- or water-cushions, in rings or other shapes, are often employed to take the pressure off of tender parts. They may sometimes do good; but, in surgical practice, I have been repeatedly disappointed with them, especially with air- and water-cushions or pillows. When bedsores actually occur, it is *necessary* to relieve the sores from pressure; and, besides, they must be treated like open wounds or ulcers. (See **Ulcers**, later, under **Accidents** and **Injuries**, etc.)

SICK-GARMENTS.

As simple as possible these should be. One sufficiently warm and long night-shirt or night-gown will, as a rule, be enough; the less worn, the easier will it be to make changes. If the limbs incline to be cold, light drawers may be added; with the old and feeble, stockings also. Changes of garments worn constantly in bed should be frequent. One "robe" for the day and another for the night would be well, but for the fatigue of so many movements.

There should be no *exposure to cold* during such changes. There need be none, if the room is moderately warm at the time (70° Fahr.) and the fresh garment is well warmed near the bed. One arm should be taken out of the sleeve it is in, and put in the new one; then the old shirt should be lifted off over the head, and the new one put in its place; lastly, the other arm should be changed and the shirt drawn down. When a long gown is ready to put down over the head and shoulders, the old one can be drawn off at the feet.

If any garment becomes soiled, it must be removed as soon as possible. There are, of course, some states of extreme debility in which it is not safe to move the patient so often as above said. But, by having garments made loose, and cut or ripped if necessary to facilitate removal, the refreshment of such changes may be obtained in more cases of illness than many people suppose.

When the disease from which a patient suffers is *contagious*, as small-pox, scarlet fever, measles or typhus fever, every article of clothing worn, as well as the sheets, blankets and bedding, must be (for safety to others) either *boiled* or *burned*. In malignant cases, or those attended by much soiling of the clothes, they had better be burned. In other instances they may be thoroughly boiled, and then spread out in the sun to dry.

WASHING AND BATHING.

Every morning, at least, a sick person's face should be freshened up by washing, in whatever manner his strength best allows. One really ill must have it done by another person. A soft "wash-rag" may be used. The water may be cold, if there is fever, or if there is not prostration with a tendency to chilliness. In the latter case, warm water is better, even for the face. Warm water should be used also to wash the arms and legs and other parts of the body. In weak conditions, whisky may be added to warm water for bathing the limbs, and pure whisky or soap liniment should be used to bathe any parts of the skin which are subject to pressure. This is often important to prevent *bed-sores*. If the skin is quite or almost broken, a piece of buckskin spread smoothly with soap-plaster, or a piece of elastic adhesive plaster, or even common adhesive plaster (two thicknesses) may be, as already said, put on to make an artificial protective cuticle.

When fever is hot and high, cool washing of the body is of great value. Some physicians now advise even *cold* baths for typhoid fever. I do not think well of this practice; unless, at all events, the patient is put in water which is at first warm or tepid, and cooled down gradually; also, without exposure to a low temperature for many minutes at a time. But *cool sponging*, in scarlet fever as well as in typhoid, is, without doubt, not only relieving but useful. It may be repeated two or three times daily.

In cases of *low* fever, and other cases in which restlessness at night is a symptom, bathing the arms and legs (one at a time, so as not to chill by exposure) with whisky and hot water (equal parts) often gives much comfort and promotes sleep.

Warm baths are frequently very beneficial in states of nervous excitement; as in the *convulsions* of children. Prolonged warm baths are also advised sometimes for *tetanus* (lock-jaw), and to promote the reduction of *hernia* (rupture). In spasmodic *croup* in children, a warm bath is often helpful. *Hot* baths do good in cold or depressed conditions of the system; as in *chronic rheumatism* or *neuralgia;* and when the eruption does not come out or stay out well in *scarlet fever*, *measles*, or *small-pox*. (See pages 342 and 556 on Bathing.)

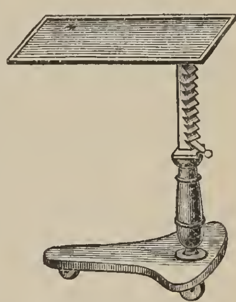
FOOD OF THE SICK.

Appetite almost disappears in severe illness, especially when there is fever; and the capacity to digest food is then nearly lost. Yet, in acute febrile attacks of disease, as well as in prolonged maladies like consumption, the waste of the substance of the body goes on faster than during health. How, then, are we to make it up? Evidently, by giving strong, **concentrated** food, in the **liquid** form, in **small quantities**, at short **intervals.**

A young and robust person may, at the beginning of an illness, be better for a day or two with almost no food. After that, even such an one will gain by taking frequently small portions of liquid nourishment. *Feeble* patients need, as a rule, to be so fed from the start.

The main staple article of diet for the sick is the same as for infants; namely, **milk.** And for the same reasons; that it contains all that is essential for the system, in a form easy of digestion and appropriation. In *typhoid fever*, for example, almost from the beginning, a patient may be fed with two tablespoonfuls of milk every two or three hours, day and night. Another concentrated article is **beef-tea**; and stronger yet, **beef-essence.** As was remarked under **Hygiene**, the mistake has been very often made, and is encouraged in many books on such subjects, of *straining* or *filtering* beef-tea, after it has been subjected to a boiling heat. Its most nourishing part is thus left behind. It ought to be brown with finely divided particles (not solid pieces, of course) of the meat. The same is true also of *essence* of beef, made without the addition of water. (More about these preparations presently.)

Fig. 202.



BED-TABLE (WITH RACK).

Next to these articles of food, come broths or teas of other meats; as *mutton* and *chicken soups*. They should, for the sick, be made strong, not watery; but should be thoroughly rid of their fat, by skimming. This can be most effectually done when they have stood and become cool; but, except in the warmest weather, they should be heated again to be taken.

Prepared extracts of beef are much in use, to save trouble in getting the fresh article. *Liebig's* has been the most famous; but, as it is prepared with heat and then filtered, it leaves out most of the *nourishing* part of the meat, and is rather a nutritive *stimulant* than a food.

Valentine's beef-juice is prepared *without boiling*, and has the substance

of the beef in a very concentrated state. Most people can take it very well. Two teaspoonfuls of it may be added to about a quarter of a tumblerful of water (hot or cold, as preferred), this being given two tablespoonfuls, more or less, at a time.

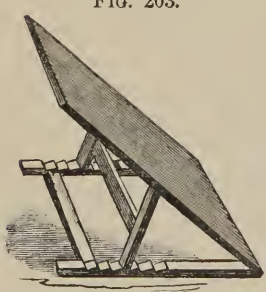
Johnson's fluid beef is agreeable to some persons, and, when so, answers a very good purpose. To my taste, it is unpleasant. Many physicians recommend it, and use it largely. *Beef peptonoids* are much used.

Jellies are *weak* food; good only for variety, or to hold something stronger, as a matter of taste.

Fruits are commonly pleasant during fever, but they are most of them rather too hard to digest. *Malaga grapes* will almost always agree well. *Orange juice* (without swallowing the pulp) does so also, and is often very refreshing to the sick. *Lemonade* is pleasant and cooling, but requires consideration of the condition of the stomach and bowels at the time. One of the best things to *clean* a *foul tongue* during fever, is *half a lemon*, passed slowly over it now and then.

Stimulants are often added to the diet of the sick, when patients are much prostrated or exhausted. Their use requires great caution and judgment. As a rule, they should not be employed without the advice of a physician. *Wine-whey* and *whisky-punch* are most frequently advised. They are most apt to be appropriate in *typhus fever*, in the weakest cases of *typhoid fever*, and in the *late stages* of severe acute diseases. Also, they may be called for in *cholera*, and in certain conditions which are met with in advanced or advancing *consumption of the lungs*.

FIG. 203.



BED-REST.

Convalescence is generally attended by the return of a good appetite and digestive power. The system has to make up for what it has lost during illness. Care is necessary that the patient does not venture too soon upon a *varied* diet, or the use of things hard of digestion. *After typhoid fever*, this is particularly necessary. From the special condition of the intestinal canal in that disease, life may be endangered at that time by a single imprudence in diet. Gradually, however, after most diseases, recovery is marked by ability to eat all ordinary wholesome food, and a variety of digestible dishes may be indulged in, always, of course, avoiding excess.

We will now give directions for preparing a number of articles especially suited for the food of the sick; those, that is, who cannot properly take ordinary solid meals.* Different things are required for different cases. Of this the physician must judge, when one is in attendance. In his absence, those in charge must be guided by the symptoms and conditions present.

Beef-Tea.

Chop a pound of good lean round of beef into very small pieces. Pour over it a pint, or *less* (never more) of cold water. Cover it, and let it stand for two hours near the fire, or on a part of the range or stove where it will not become very hot. Then put it right on the fire, and bring it to the boil. As soon as it is fairly boiling, remove it, and take off all the scum from the top. *Pour it off* from the pieces of meat at the bottom, but *do not filter or strain it*, unless through a coarse sieve. Straining robs it of much of its nourishment. The fat must be carefully removed, which can be done best with a clean piece of blotting-paper, or a small (salt) spoon. Salt may be added according to taste; when the stomach is weak, also black or red pepper. In the extreme weakness of *delirium tremens*, red pepper may be *freely* added; a little of it is suitable in nearly every case where beef-tea is needed. Beef-tea should be *stirred* just before using it, so as to get a rich brown color.

Beef-Tea, Cold-made.

Chop finely a pound of good beef. Add to it a pint of cold water, in which have been put fifteen drops of chlorohydric (muriatic) acid, and a pinch of salt. Let it stand an hour, and then drain off the liquid. Pour another half-pint of cold water over the beef that is left, and add it to the first quantity. All may be then strained through a coarse sieve, and used cold.

Frozen Beef-Tea.

Put a suitable portion of Beef-Tea, made as above first directed, in a convenient vessel, within an ice-cream freezer. Let it then be frozen as if it were cream. This is particularly suitable in the *summer complaint* (cholera infantum) of children; also in some other cases in hot weather.

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* To show that fluid food may suffice even for a length of time, I have just read an account of a man who died at the age of eighty-five years, who, when seven years old, swallowed by mistake some strong lye, the effect of which was to contract his œsophagus (lower gullet) so much, that he never afterwards could swallow solid food.

Beef Essence.

Cut up a pound of good lean beef into small pieces, and put it into a pint bottle (or other handy receptacle), without any water. Cork the bottle *loosely* and place it up to its neck in water in a stewpan. Then *boil* the water in the pan for three or four hours. This will bring out the juice (essence) of the meat, which should be *poured* off, not strained. The fat must be removed as with beef-tea. This is the most concentrated of all articles of food. It is often of the greatest value in conditions of prostration; as a little of it goes a great way, while requiring almost no effort of digestion. Red pepper may usually be added to it in moderation, and salt according to taste.

Broiled Beef Juice.

Broil a pound of lean beef. Cut it into strips, and press out the juice with a lemon-squeezer or meat-press. A pound of meat will give about three tablespoonfuls of "gravy" or juice. When salted according to taste, it may be taken either hot or cold, as preferred.

Raw-Beef Extract.

Cut up good lean beef *very fine*, and put a pound of it with half a pint of cold water in a bottle. Let it soak for about twelve hours, skaking it well half a dozen times or more during that time. Then pour it off through a coarse sieve, and salt according to taste.

Raw-Beef Scrapings.

Take a piece of good tender beef, and, with a rather dull knife, scrape off all of it that will come, leaving the tough, gristly portions behind. The pasty meat thus obtained may be salted a little and used at once as it is, or it may be rubbed up with half its quantity of granulated white sugar. The latter plan will be likely to suit children best.

Good well-boiled *ham* (as well as *dried beef*) may be treated in the same manner. Infants recovering from summer complaint are sometimes very fond of such food.

Chicken Broth.

Clean half a chicken and remove the skin. Pour on it a quart of cold water, and salt to taste. Add a tablespoonful of Carolina rice, and boil slowly for two or three hours. Then skim it well to get off all the fat, and add a little parsley. This is one of the most agreeable of dishes for many sick people.

Oatmeal Gruel.

Boil a pint of water, and while boiling, mix with it two tablespoonfuls of (Canada, Bethlehem, or Ohio) oatmeal, which has been first rubbed smooth in a little cold water; also, add half a pint of milk, and a little salt. Let all simmer together for half an hour, then strain it through a hair-sieve, sweeten, and add a little nutmeg. A few raisins may be added before the boiling.

Indian-Meal Gruel.

Stir a tablespoonful of Indian meal till it becomes smooth, in half a teacupful of cold water. Then mix it well with a teacupful of boiling water, and add half as much milk; then boil it until it is moderately thickened. Salt or sweeten according to taste. Raisins may be put in before boiling, if desired.

Barley Water.

Wash well two ounces of pearl barley with cold water, throwing that water away. Put the barley into a pint and a half of fresh cold water, bring it to the boiling point, and boil for twenty minutes in a covered vessel. Strain, sweeten to taste, and flavor with lemon-juice and a little lemon-peel. In certain cases, as in using it to feed infants, the lemon had best be omitted.

Rice Water.

Boil an ounce of Carolina rice in a quart of water for an hour and a half. Pour off or strain, and add either salt or sugar and nutmeg, according to taste. Salt will generally be best.

Toast Water.

Cut a slice of stale bread half an inch thick, and toast it brown all over, without scorching. Pour over it a pint of boiling water; cover closely, and let it cool; then pour or strain it off for use as a drink. Some patients like it better when a slice from an apple, and a very little lemon-peel, are laid on the toast before the water is added.

Bread-and-Butter Soup.

Spread a slice of well-baked bread with good fresh butter, and sprinkle it moderately with salt and black pepper. Pour a pint of boiling water over it, and let it stand a few minutes before use. This will do for patients who are not very sick, as a soft article of low diet.

Panada.

Cut two slices of stale bread, without crust. Toast them brown, cut them up into squares about two inches across, lay them in a bowl, and sprinkle with salt and a little nutmeg. Pour on a pint of boiling water, and let it stand to cool.

Vegetable Soup.

This may be made, of course, in many different ways. The following is about the simplest: put two potatoes, a handful of peas, one ripe tomato, and a piece of bread, into a quart of water, and boil it down to a pint. Then throw in a little chopped celery or parsley, and salt. Cover, and remove from the fire. A delicate stomach may require it to be strained for use.

Boiled Flour.

Tie up a quart of wheat flour in a pudding-bag, tightly. Put it into a pot of boiling water, and keep this boiling for several hours (all day or all night will not be too long). Then take out the flour and dry it near the fire. Peel off and throw away the thin outer portion, and grate down the mass, with a nutmeg-grater, into a powder, for use as wanted. One or two teaspoonfuls of this may be rubbed into a paste with a little milk, and then stirred into a pint of milk, which is to be *scalded;* that is, just brought to the boiling-point, without being boiled. This is often beneficial in the *diarrhœas* of infants or older persons.

Arrow-root.

Mix a tablespoonful or rather more with a little cold water, till it becomes smooth and pasty. Boil a pint of water, stir in the arrow-root, and boil it for a few minutes, until it thickens sufficiently. Sweeten to taste with white sugar, unless salt be preferred. A little lemon-peel or orange-peel added before boiling will improve the flavor.

Tapioca.

Cover two tablespoonfuls of tapioca with a full teacupful of cold water, and let it soak for several hours. Put it then into a pint of boiling water, and boil it until it is clear and as thick as is wanted. Sugar, nutmeg, lemon, etc., may be used to season it.

Sago Jelly.

Mix well together four tablespoonfuls of sago, the juice and rind of one lemon, and a quart of water. Sweeten to taste, let it stand half an hour, and then boil it, stirring constantly, until clear.

Farina Gruel.

Mix two tablespoonfuls of farina with a quart of water, and let it boil long enough to become thick. Add a pint of milk and a little salt, and then boil again for a quarter of an hour. Sweeten according to taste.

Rice Milk.

Boil a tablespoonful of rice for an hour and a half in a pint of fresh milk, then rub it through a fine sieve. Add a tablespoonful of fine (granulated) white sugar, and boil again for two or three minutes.

Oatmeal with Beef-Tea.

Mix a tablespoonful of oatmeal quite smoothly with two tablespoonfuls of cold water. Add this to a pint of strong beef-tea, and heat to the boiling-point, stirring all the time. Boil for five minutes. Then remove from the fire, skim off all the fat, and serve for use.

Other occasional additions to beef-tea, which will agree with all except the most delicate stomachs, are (though not both at once) raw *egg* and *cream*.

Dr. J. F. Meigs' Gelatin Food.

Soak for a short time in cold water a piece of prepared gelatin two inches square. Boil it, then, in half a pint of water until it dissolves, which will take ten or fifteen minutes. Rub a teaspoonful of arrowroot into a paste with a little cold water, and stir it into the gelatin water at the end of its boiling. Add also from six to twelve tablespoonfuls (according to the child's age) of milk, from one to four tablespoonfuls of cream, and a moderate amount of loaf-sugar.

Imitation of Mother's Milk (Dr. A. V. Meigs).

Obtain from a druggist packages of pure *milk-sugar* containing, each, seventeen and three-quarter drachms. Dissolve one package in a pint of hot water. Mix together two tablespoonfuls of cream, one of milk, two of lime-water, and three of the milk-sugar water. Warm this mixture, and add it to the pint of solution of milk-sugar in hot water. It is then ready for use.

The packages of milk-sugar, while dry, will keep for a long time. The solution of it should not, in hot weather, be kept on hand for more than a day or two, at most.

Egg Broth.

Mix two ounces of pearl sago in half a pint of cold water, and let it stand half an hour. Then boil it until it becomes smooth and suffi-

ciently thick. Beat the yolks of four fresh eggs with half a pint of cream; then mix with the sago, and stir the whole well with a quart of beef-tea, or chicken-broth, just made and at boiling heat.

Egg with Wine.

Beat up a raw fresh egg, and stir with it one or two tablespoonfuls of Sherry wine. This, as well as the preparations that next follow, is only suitable where *stimulation* is required, under the advice of a physician.

Caudle.

Beat up a raw fresh egg with a wineglassful of Sherry wine, and add it to a half pint of hot oatmeal, Indian meal, or farina gruel. Flavor with lemon-peel, nutmeg, and sugar.

Wine Whey.

Boil half a pint of milk, and while boiling add half a glass or a glass of Sherry or Madeira wine. Strain off the curd through muslin or a sieve. Sweeten the whey to taste, and grate upon it a little nutmeg.

Milk Punch.

Into a tumblerful of milk put one or two tablespoonfuls of whisky, brandy, or rum. Sweeten, and grate nutmeg upon it. In some *very low* states of the system, punch may be directed by physicians made still stronger than this, even as much as a tablespoonful of whisky to one of milk; but the use of such a powerful means of alcoholic stimulation needs great skill and judgment.

Koumiss.

This mildly stimulant and somewhat nourishing Tartar and Russian drink is made by fermenting *mare's* milk. It may be quite well imitated, however, by adding to a quart of *cow's* milk a teaspoonful of granulated white sugar, and a teaspoonful of brewer's yeast, and leaving the mixture to ferment in a covered vessel or corked bottle. When this change has shown itself by the bubbles of effervescence, it is ready for use. If kept for any time, it should be in strong bottles tightly corked (the corks tied down) and in a cool place.

Roast Oysters.

Convalescents can sometimes relish and digest these sooner than any other solid food. (I speak partly from a personal experience, after *typhus fever*.)

Place a dozen fresh oysters (that is, not long out of their native water)

in the shell (which is closed of itself if they are good) upon a moderately strong fire, and allow them to remain there until their shells open *a little.* Then take them from the fire, open them at once, retaining the juice if possible, and serve them hot, with perhaps a little black pepper, and salt if needed. If the "hard part" is at all tough, it had better not be eaten.

To Keep Ice for the Sick.

Cut a piece of clean flannel about eight inches square. Put this (after making a *small* hole in its centre) over the top of a glass tumbler, pressing the flannel down to half or more of the depth of the tumbler. Then bind the flannel fast to the tumbler with a tape or cord. When ice is put into this flannel cup, lay over it another piece of clean flannel, three or four inches square. So covered, it will keep for hours, even in warm weather.

Flour Food for Infants.

Let from five to ten pounds of selected wheat flour be packed in a bag so as to form a ball, tied with a strong cord, and boiled with the water constantly covering it from four to seven days. The starch appears to be so changed that it is more soluble and more quickly and easily digested. It not necessary that the water be constantly boiled, provided that it remain hot or warm—the fire may go out at night. The same change may be effected by dry heat, the flour being placed in pans in the oven or on the stove, but it is very liable to be scorched by an excess of heat.

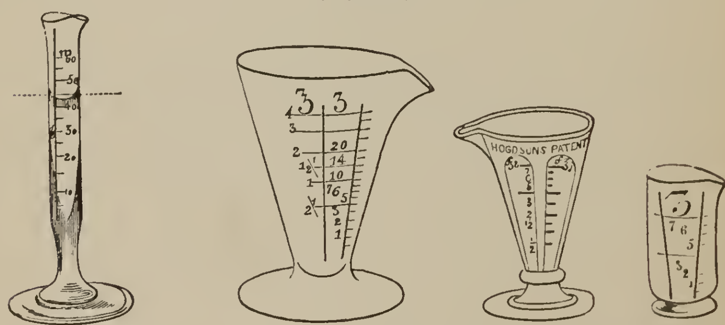
The flour removed from the bag and deprived of its external portion, which is wet, resembles a piece of chalk, but it has a yellowish tinge. The flour should be grated from it as it is required for use, and sifted to separate the small lumps which are likely to be broken off by the sieve. The infant will be better nourished if instead of diluting the milk with which it is fed with plain water, a thin gruel prepared by boiling a few minutes this flour in water, be employed. Two heaped teaspoonfuls of the flour to a pint of water suffice for infants under the age of three months, three teaspoonfuls for infants between the ages of three and six months, and four teaspoonfuls to the pint of water after the age of six months. The proportion of the gruel to the milk should be the same as stated above when pure water is employed.

GIVING MEDICINES.

No one who cannot read should pour out a dose of medicine. Bottles containing poisonous drugs should be labeled **Poison**, and such should, when practicable, be kept apart by themselves; and should, especially, never be left within the reach of children. Before pouring out or otherwise preparing a dose of medicine, look carefully at the label. No medicine should ever be kept in a bottle or other receptacle *without* a label. If a bottle which has contained one medicine is wanted for another, let it be *thoroughly* washed with *hot* water; and, on putting something new into it, change the label at once. If there is any doubt about the medicine in a bottle, *throw it away*, do not venture to use it without being sure of its nature.

After looking well at the label, before beginning to pour from the bottle, turn the labeled side away, so as not to pour over it; as some

Fig. 204.



MINIM GLASS. GRADUATED MEDICINE GLASSES.

drops are apt to run down on the bottle, and might thus stain and obscure the label so that it could not be read.

Dropping medicine requires care and skill. To do it, moisten one edge of the top of the bottle with the contents of the bottle, and then, holding and tilting the latter in the right hand, with the left very slowly and cautiously withdraw the cork or stopper, until a drop rolls out. As this comes out, at once push the cork in, and then repeat the same process again and again, until the right number of drops has been obtained.

To give medicine (or liquid food) to a patient too ill to be lifted up in the bed, a *bent glass tube* is very convenient; and so are the half-covered spoons and cups sold by apothecaries.

Glass vessels with the quantities marked on them are convenient

Some small ones are graded to *minims;* a minim is one-sixtieth part of a *drachm.* A drop of water is about a minim; two drops of laudanum make a minim; between three and four drops make a minim of chloroform. This is because the size of the drops of different liquids is so different.

Apothecaries' Measure.

60 minims (♏) . .	Make one fluidrachm, f℥.
8 fluidrachms . .	" " fluidounce, f℥.
16 fluidounces . .	" " pint, O.
8 pints	" " gallon, C.

Apothecaries' Weight.

20 grains (gr.) . .	Make one scruple, ℈.
3 scruples, or 60 grains .	" " drachm, ʒ.
8 drachms . . .	" " ounce, ℥.
12 ounces . . .	" " pound, ℔.

Common Measures.

1 fluidrachm . .	Equals about 1 teaspoonful.
2 fluidrachms . .	" " 1 dessertspoonful.
$\frac{1}{2}$ fluidounce . .	" " 1 tablespoonful.
2 fluidounces . .	" " 1 wineglassful.
4 fluidounces . .	" " 1 teacupful.*

Metrical System.

This is a *decimal* system; that is, all the divisions are reducible to tens, tenths, hundreds, hundredths, thousands, thousandths, etc. Beginning, first, to be used in France, its employment is now spreading (especially among scientific people) into all countries. The **meter** (about $1\frac{1}{9}$ yard, or 40 inches) is the standard of length; the **liter** (about a quart), of bulk or capacity; the **gram** (about 15 grains), of weight. A **kilogram** (1000 grams) is about equal to $2\frac{1}{2}$ pounds Troy, or $2\frac{1}{4}$ Avoirdupois pounds. A millimeter is nearly $\frac{1}{25}$ of an inch; a centimeter, nearly $\frac{2}{5}$ of an inch; a decimeter, not quite 4 inches; a decameter, ten meters, or nearly eleven yards; a hectometer, a hundred meters; a kilometer, a thousand meters, or more than half a mile. A milliliter is a thousandth part of a liter; centiliter, a hundredth, and

* Many teacups at present in use, however, are smaller than this; not holding more than two or three fluidounces. Variation exists also in tea and table spoons; but not to so great an extent. By a wineglassful is meant what will fill an old-fashioned Madeira-wine glass; not a hock or champagne glass.

deciliter a tenth part of a liter; a decaliter ten liters, hectoliter a hundred, and kiloliter or stere, a thousand liters. A milligram is the thousandth part of a gram; centigram one-hundredth, and decigram one-tenth part of a gram; a decogram ten, a centigram a hundred, and a kilogram one thousand grams. These measures and weights are not yet much in use in this country; but they will probably, some time, become universal.

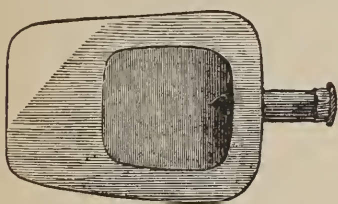
Medicine bottles or similar fixtures should never be kept in sight of a patient; nor should the mixing, dropping, etc., be done where he can see it. If but one room is available, a screen had better be made (of a small clothes-horse, for example, with shawls, etc., hung over it) behind which such things may be attended to. When possible, the next room, or a table in the adjoining entry, will be better.

The *times* for the administration of medicines will, of course, be directed by the doctor. They had better, in all serious and continued illnesses, be *written down* as soon as ordered, to prevent mistakes. In the absence of a physician, no medicine should ever be given without a *clear and good reason* for it. The idea that somebody must "do something" always for sickness, whether anybody present knows what to do or not, is absurd. Such may turn out to be "deadly doing," indeed. Better do nothing at all than risk harmful interference with nature.

EXCRETIONS: DISCHARGES.

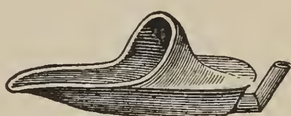
Enough has been said under **Hygiene**, and **Purgative Medicines**, etc., upon the general subject of the necessary action of the skin, kidneys, and bowels. When a patient is ill enough to be confined to his room, care must be taken by those in charge that the *air* of the room be not *tainted* by his discharges. No vessel should ever be left *for a moment uncovered;* and none should remain in the room after being used longer than is unavoidable at the time. When it is important for the physician to examine the discharges, the vessel should be kept away from the chamber; out of doors if possible, or in a ventilated water-closet. As soon as the doctor has finished his inspection, let the vessel be at once emptied and washed with *hot* water. Hot *soapsuds* will be better. When the disease is contagious or infectious (or even is suspected of being so), the vessel should, every time, be disinfected by adding to the water with which it is washed a tablespoonful of a strong solution of *permanganate of potassium*, of *corrosive sublimate*, or of *chlorinated*

Fig. 205.



BED-PAN.

Fig. 206.



SLIPPER URINAL.

soda. (Carbolic acid has been much used in this way; but it is less effectual than the above articles, and is much more disagreeable.)

When a patient is strong enough to get into a bed-chair, it should be placed close to the side of his bed; and then he can be helped to it by one, or, if very heavy, two persons; one supporting the head and shoulders, and the other the lower limbs.

In most cases of typhoid fever, and in many other prostrating diseases, the patient has to remain in bed, and use a bed-pan; sometimes, a urinal. Either must be *warmed* before being placed under the patient. If his head and shoulders can be raised moderately, it will assist him. Some nervous patients cannot relieve themselves, especially the bladder, while any one is looking at them, or even is in the room.

In low states of fever, retention of urine, which the patient cannot evacuate, is not uncommon. As already said, this must be remembered

and watched for. If the amount passed is very small, or none, the lower part of the abdomen should be examined. A full bladder will make that region firm, perhaps a little swollen, and giving out a *dull* sound when lightly tapped (percussed) with the finger. In such a case, a *catheter* must be introduced; twice at least in twenty-four hours, to draw off the water. (See **Catheter,** on a previous page, under **Remedies.**) If nothing comes away through the catheter, there is *suppression* of urine, which is a very bad sign indeed. See page 562.

In persons who have had an *injury of the spine*, or who suffer from severe *disease of the spinal marrow,* the discharges from the bladder and bowels may come away involuntarily; perhaps without being felt by the patient. There must then be frequent inspection and attention by others, not only for the sake of cleanliness and comfort, but to prevent irritation of the skin, as well as contamination of the air of the room. Foul odors are always a sign of the presence of something unwholesome, making the air unfit to breathe. To *prevent* such odors is best. When they cannot be prevented, *airing the room* well (with care to protect the patient from cold draughts) is the next best thing. *Disinfectants* strong enough to have much influence upon its atmosphere can hardly be used in an *occupied* room. *Burning grains of coffee* on a heated shovel is the most agreeable way of concealing or modifying unpleasant odors in an occupied apartment.

SLEEP.

As important as food it is for every sick person to get an abundance of sleep. Disease often conflicts with nightly rest; where there is delirium, it is more likely to be present at night than in the daytime.

Quietness, of course, is a prime necessity when sleep is sought; quietness of mind as well as of the body and of sights and sounds in and around the sick-chamber. The night-light had better be in the next room, with the door open, or in the passage outside; if in the room with the patient, the flame must be screened from his eyes, and the light must not be a bright one.

Bathing the arms and hands, legs and feet, with whisky and hot water (half and half) near the ordinary sleeping time, is a good tranquillizing measure. For *remedies* for *sleeplessness*, see on previous pages, what has been said of **anodynes.** Such should not, as a rule, be given without medical advice.

No sick person should ever be waked, when sleeping, if it can possibly be avoided. It becomes a question, in some cases of great prostration, which is most necessary—unbroken sleep or frequent nourishment. In typhoid and typhus fevers, there is mostly a drowsy habit; so that, after being awakened to take liquid food, the patient soon drops off to sleep again. In such cases, it is right to rouse him every hour or two to take something, lest he "slip through our fingers." I remember well, when going through an attack of typhus, the dreadful feeling of "goneness" on waking from an hour's sleep; relieved for the time by a tablespoonful or two of milk. In severe illness, the time of greatest weakness usually is between one and three o'clock in the morning.

When sleep or drowsiness follows a severe *blow on the head*, it should be *indulged and encouraged.* It is then very needful, to allow the brain to recover from the severe shock.

Quite otherwise is the case when stupor results from *poisoning with opium* (laudanum or morphia). Then profound sleep may end in death. The patient must be kept awake if possible, even by rough means; as slapping his back or limbs, or making him walk about. This is the only exception to the important rule, that *sleep is nature's restorative, not only from fatigue, but also from sickness.*

MENTAL MANAGEMENT.

In this, the nurse's judgment is shown as much as in anything else. A nurse must never be "gossipy"; must, indeed, seldom "talk" at all, beyond quietly asking and answering necessary questions. As few questions as possible should be asked of a patient. His wants should be *anticipated* and provided for. Never, for example, ask whether he would not like this or that article of food. Bring what is suitable, in as pleasant a way as can be; and, when it has been taken or refused, remove at once all dishes, etc., out of sight.

Of all things, do not tell a sick person about others who have lately died of the same complaint, or any other doleful news. As to his own case, encourage hope, without falsehoods; which are inexpedient as well as immoral. Wear a *cheerful countenance*, always, in the sick-chamber. Yet the sufferer must know that he has your sympathy.

If there is delirium, do not contradict or argue against strange imaginings. Rather accept them, silently; or, if a reply be wanted, turn them in the quietest way from anything disturbing.

Visitors often do much harm to sick people. *One person in the room at a time* should be the rule in serious illness, and that one as near as the mother, wife, sister, or nurse; that is, one of these *in turn* with the others. It is intolerable cruelty, or else suicide, for one woman or man, alone, to be allowed to remain constantly, day and night, for weeks together, in charge of a very ill patient. But the general principle is, that patients having *fever*, of any kind, and those having *nervous symptoms*, should *see no company*. Even near and dear friends should be excluded, and should only send kind words of inquiry and sympathy. This often seems hard, but it may turn the scale at critical times, and ought to be insisted on.

Chronic diseases, such as consumption, dropsy, etc., will often bear a moderate amount of company; but each case should be judged of for itself by the medical attendant. *Convalescent* patients, whose fever has all gone, will often *benefit* by seeing new faces, at least those of old friends, though even their visits should not be long.

*Change** is generally a good thing during convalescence. If the room of the patient cannot be safely or conveniently changed, alter the

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* Change of position in bed, so far as to sit propped up, is refreshing, when strength allows it. For this, in the absence of a "bed-chair" or frame made for the purpose, a common chair may be used, placing it *upside down* behind the pillows, so that the back of the chair makes an inclined plane.

arrangement of the chairs in it, and of the pictures on the wall. Let flowers be put in sight. Somehow, make from time to time fresh and agreeable impressions, to remove those which illness has left. Yet much *excitement* or *mental effort* must be guarded against, as the brain and nerves are often weak and sensitive for some time after illness with fever.

RUBBING: MASSAGE.

Systematic rubbing over the muscles and other parts of the body is now often used, as a means of quickening a slow circulation, and removing torpor of nutrition and other functions. Such rubbing and kneading is **massage,** or **manipulation.** A rubber is, in French, a *masseur;* if female, a *masseuse.* It is an ancient practice, even among savage peoples; the *lomi-lomi* of the natives of the Sandwich Islands is an example of it. It has been familiar to the Brahmins of India, and is traced back as far as to the Egyptian priests, before the time of Hippocrates. It is now employed chiefly in cases of general debility and nervousness, with patients who are not in a condition to use much, if any, muscular exercise.

How it is done, is thus told by Dr. S. Weir Mitchell, in his little book, "Fat and Blood, and How to Make Them":

"An hour is chosen midway between two meals, and the patient lying in bed, the manipulator starts at the feet and gently but firmly pinches up the skin, rolling it lightly between his fingers and going carefully over the whole foot; then the toes are bent and moved about in every direction; and next, with the thumbs and fingers, the little muscles of the foot are kneaded and pinched more largely, and the interosseous* groups worked at with the finger-tips between the bones. At last the ankles are dealt with in like fashion, all the crevices between the articulating bones being sought out and kneaded, while the joint is put in every possible position. The leg is next treated, first by surface-pinching and then by deeper grasping of the areolar tissue, and last by industrious and deeper pinching of the large muscular masses, which for this purpose are put in a position of the utmost relaxation. The grasp of the muscles is momentary, and for the large muscles of the calf and thigh both hands act, the one contracting as the other loosens the grip. In treating the firm muscles in front of the leg, the fingers are made to roll the muscles under the cushions of the finger-tips. At brief intervals the

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* Between the long bones of the foot.

manipulator seizes the limb in both hands, and lightly runs the grasp upwards, so as to favor the flow of venous blood-currents, and then returns to the kneading of the muscles. The same process is carried on in every part of the body, and especial care is given to the muscles of the loin and spine, while usually the face is not touched."

At first this is continued for but half an hour at a time; gradually it may be increased, if it appears to agree with the patient, to an hour daily or every other day. Men who are very hairy had better have the limbs and breast shaved, to prevent the irritation of the skin from pulling the long hairs, which sometimes even causes sore pimples or boils. Every "rubbing" should be followed by at least an hour's entire repose.

Dr. Mitchell advises that, after the first few days, *cocoa-oil* or *vaseline* shall be used to rub with. I believe this to be a very beneficial addition to massage, one not appreciated as highly as it deserves to be. Some oil is absorbed, with not only a soothing, but also even a nourishing effect. *Cod-liver oil* is sometimes thus employed, especially with feeble children.

When there is *tenderness* anywhere, rubbing should be practised *all around* the sensitive part, gradually approaching it. In this way, as over the spine, or on some part of the abdomen, it can be at least all included in the manipulation, removing the tenderness, to great advantage.

Whether rubbing will do good or not, depends largely on the judgment and skill of the *masseur* or *masseuse*. Dr. Mitchell's advice to disregard such effects as increased nervousness and loss of sleep, is, as I know from observation, not sound or safe. "Professional" rubbers sometimes think they must rub their hour through, if they risk rubbing out the patient's life; and thus they may do harm to feeble patients. If the patient "feels worse" after the hour's massage, the length of time given to it had better be lessened, and the interval between times increased.

Electric massage is practised by lightly passing over different muscles and other parts a metallic brush of fine wire, connected with a battery.*

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* To show what refinement of procedure is brought into "rubbing" by some practitioners, the following extract is taken from a medical journal:

"THE TECHNIQUE OF MASSAGE.—Dr. Benster summarizes the method of practising massage, followed by the French, as follows: 1. *Effleurage*, gentle friction, consists in making long, gentle, centripetal strokes along the course of the veins and lymphatics with the oiled hand. The pressure is intermittently firm and gentle, so made as to produce a sort of passive peristalsis. 2. *Massage à friction*, the rubbing stroke. This is accomplished by making elliptical strokes perpendicularly to the long axis of the limb with the finger-tips of one hand, while the fingers of the other hand pass from above downwards, parallel to the axis of the extremity. A subdivision of this class is the *massage par ondulation*, as used by Laisne in lumbago. 3. *Pétrissage*, kneading, is

MANAGEMENT OF LABOR.

Before entering upon this, it will be well to go back so far as to consider the *signs of pregnancy*. First, usually, is the *cessation of the menses*. This may, of course, happen, in the married as well as the unmarried, from cold, mental disturbance, or other causes. But, with the married, in the absence of any such causation, it is to be noted as probably indicating what is to come. In the first month, *morning sickness* is generally a conspicuous sign; but it varies much in severity. Some scarcely feel it, while others are prostrated by it for months, only obtaining relief with parturition. Moderate nausea and vomiting, during the first and second months, are the rule. *Quickening*, toward the end of the fourth month, is the first feeling by the mother of the movements of her child. It is a popular error to suppose that the child only then begins to live; it is a living being from the time of conception.

In the first month, there is some *sinking* to be seen in the region of the *navel*, afterward, at least in two months more, that region begins to fill up and expand. *Enlargement* of the abdomen is not marked until at least the third month. It becomes conspicuous by the fifth or sixth. The *breasts* enlarge quite early. The "*areola*," or space around the nipple, often grows brown, with glandular lumps or tubercles in it. Physicians obtain other evidences of pregnancy by careful examination (especially hearing the sounds of the *fœtal heart* on *auscultation* of the abdomen). But when those signs just mentioned are all present, there can be no doubt; quickening, of course, if *certainly felt*, being the most conclusive. Discolorations of the skin over the abdomen are frequently observable in the seventh and eighth months. Swelling of the veins of the feet and legs is not uncommon about the same time. In the ninth month, vomiting occasionally returns; sometimes the pressure upwards causes difficulty of breathing. During the last week or two, however, before delivery, the abdomen often "goes down" perceptibly, relieving the breathing, but making walking uncomfortable. One who has piles, at such a time is apt to have them swollen and troublesome.

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made always in a direction from the periphery toward the centre, and in such a way that the morbid tissues are seized by the hand, raised up and kneaded. This is employed in œdema of the skin, infiltrations into the subcutaneous connective tissues, and on muscles which have lost their pliability through infiltration, inflammation, or contractures. 4. *Tapotement* consists in a tapping or beating of the diseased parts by the finger-tips, the hollow hand, the side of the hand, the fist, the percussion-hammer, or a little rubber ball fastened to a piece of whalebone. This is employed chiefly in neuralgia."—*Wiener Medicinische Wochenschrift*, October 27, 1883.

Constipation of the bowels is frequently present during pregnancy, with, in a certain number of cases, deficient secretion of water by the kidneys. Both of these are results of the pressure of the greatly enlarged womb upon the intestines, and upon the large blood-vessels, interfering more or less with their usual circulation and functional action.

Keeping the bowels open is important, all through; but *gentle* means must be used. Such are, oatmeal mush or gruel; fresh or stewed fruit, especially prunes; rhubarb; sulphur; and *small doses* of mild salines, as Tarrant's Powder, or Püllna, Friedrickshalle, or Hunyadi Yanos waters. For scanty secretion of urine, *cream of tartar* is a safe medicine; a teaspoonful, diffused in a tumblerful of water, and stirred up when taken, in the course of the day.

When *headache* is present during the latter part of pregnancy, it is especially important to keep the bowels and kidneys in a good state of action. If, at the same time, the face is flushed, and the pulse is strong and full, medical advice had better be obtained. One of the dangers then is of congestion of the brain and *convulsions*. Some women are helped, at such a time, by moderate bleeding from the arm. A vegetable diet is, as a rule, then suitable, if the patient has ordinary strength and appetite for food.

Nine months are commonly understood to complete the normal period. It may be more correctly said to be two hundred and eighty days. Still, not much error is likely to occur, if we count nine ordinary months from the time the patient was last unwell. A variation of a week or two, either way, may take place, without anything being seriously wrong. (**Miscarriage**, abortion, will be considered hereafter, in due place.)

When the anxiously expected crisis, the most momentous in a woman's life, is near at hand, she commonly becomes uneasy and restless. Some vaginal discharge ("show"), more or less colored towards the last, with sickness of the stomach, and disposition to empty often the bladder and bowels, are apt to precede or attend the first pains of labor.

Labor has three stages: 1. That of the opening of the *os uteri;* that is, the natural orifice at the lower part of the womb, through which, by the contraction of the uterine muscular fibres, the child is to be extruded. 2. The expulsion of the infant from the uterus and through the external (vaginal) passage, constituting *birth.* 3. The separation and expulsion from the contracting womb and external parts of the *placenta* or after-birth.

Timely **preparation** for labor is needful, to avoid confusion, which might be disastrous at such a time.

The **room** should be in the quietest part of the house, well aired, and sufficiently warmed if it be winter; also, free from danger of any foul atmosphere, from a water-closet or any imperfect drain.

Appliances likely to be wanted are, a night-chair if obtainable; two chamber-vessels; a bed-pan; a saucer containing good fresh lard (vaseline is sometimes preferred); Castile Soap, a wash-basin or two, plenty of towels, and water for drinking, as well as washing (*warm* water must always be at hand); also, ice; a cruet of vinegar; several extra sheets; two oil-cloths or rubber-cloths, half as large as the surface of a bed; a number of soft, clean napkins; a band or towel large enough for the mother's abdomen; a small blanket to receive the infant; clothing for the infant; a small bath-tub, a soft sponge, a piece of tape or patent thread, and a pair of scissors. Many physicians will also require an antiseptic solution; as one made of equal parts (one or two tablespoonfuls) of carbolic acid and glycerin; or boroglyceride dissolved in glycerin; or corrosive sublimate, two grains in a pint of water; or whatever else may be directed.

The **bed** must not be a feather bed. It may be a wire or spring bed, covered with a firm, but not too hard, mattress. Over this should be put, first, a large piece of oil-cloth or rubber-cloth, covering the lower half of the bed. Next, a sheet. Then another oil-cloth or rubber-cloth, and on it a second sheet. After labor is over, the upper sheet and rubber-cloth can be removed, and the mattress will still be protected. If there is but one rubber-cloth or oil-cloth used, the sheet which is to remain after labor may be first doubled up above the edge of the rubber-cloth; so that, when labor is over, and all has been cleansed (for the time) below, the clean sheet may be brought down in place of the one removed. It will also be well to lay on the lower half of the bed an old quilt, comfortable, or blanket (which can be burned afterwards), to receive the discharges at the time of delivery.

The patient should, when labor is evidently approaching, have her hair well brushed (as this cannot be done again for two or three days or more), and, unless the bowels are spontaneously *well* opened, she should have an *injection* into the lower bowel of warm water, Castile soap, and a teaspoonful of castor-oil (or a tablespoonful of sweet oil), with a teaspoonful of salt, all mixed together. A clean night-gown should be put on, with a wrapper over it while walking about. When the bowels are moved near the expected time of labor, the patient *must not use a water-closet*, for obvious reasons. A night-chair or vessel must be used, if she is able, before labor, *outside* of the room in which she is to be confined, so as to maintain the purity of its atmosphere. It is also very important to have the *bladder* emptied of water before the second stage of labor begins. Most commonly, this happens freely of itself. When no water is passed for a number of hours, a catheter had best be used; unless the nurse can, by passing two fingers into the

vagina, press the child's head up and away from the bladder, so as to remove the obstruction, and allow the urine to be passed.

When the patient has to be fairly *put to bed*, her clean clothing should be turned up above her waist, and an old skirt, or a sheet folded of proper width, should be fastened around her hips and lower limbs; all of which can be taken away when delivery has been accomplished.

First Stage.

This is the longest of the three; it may vary from an hour to a day or so; commonly it takes three or four hours or more. It is marked by *cutting* and *grinding* pains, chiefly towards the *back*, with considerable intervals between them. As the *dilatation of the os uteri* comes to be nearly completed, these pains follow closer together, and are more severe.

If a physician is at hand, it is desirable that an *examination* should be made, during this stage, to know what part of the child is "presenting"—that is, coming down first. In *normal* (the most favorable) labor, this will always be the *head*. If no physician is at once procurable, a nurse may ascertain the general nature of the presentation. The forefinger of the right hand is, between two pains (after being anointed with lard, oil, or vaseline), introduced,* knuckle first, and then unfolded so as to touch the descending, partly-opened, *os uteri*. Within this, when there is a *hard*, *broad* body, *uncovered* if the "waters have come away" (that is, if the natural membranous covering of the fœtus, containing fluid, has *broken*, as it does nearly always, during the first stage), or, if not, *reachable* by gentle pressure *through* the covering membrane—in such a case, the head is coming first; which is, so far, well. If a *soft* tumor, *narrower* and *double*, is felt, it is the *breech*. If a shoulder, hand, foot, or the cord comes down first, difficulty in the labor may be apprehended, and a skilful obstetrician must be summoned as soon as possible. In this work, it would be out of place to try to substitute, by specific directions, the knowledge and skill needful in *emergencies* of labor. Such knowledge and skill can only be obtained by study and professional training and practice. Our account of the subject is properly intended to afford such general information as will enable an intelligent person to do what may be safely done before the doctor comes, and to understand, appreciate, and assist or sustain the practitioner in whatever he or she finds necessary to be done.

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* No one should make such an examination without first cutting and cleaning the nails, and then washing the hand *thoroughly* in *hot* soap-water, adding to the water, if practicable, some antiseptic solution—as carbolic acid and glycerin (a teaspoonful of each), or a teaspoonful of Labarraque's solution of chlorinated soda, or a solution of corrosive sublimate, from two to five grains to a pint of water.

Second Stage.

While only the *cutting* pains have been present, the patient may walk about, sit or lie down, as she prefers. She should not, during that stage, try to help the pains, by any voluntary effort. When real *bearing-down* pains, extending from the back through to the front, come on, she must go to bed. Mention has already been made of the proper preparation of the bed, and of her clothing.

What *position* in bed is the best? Here authorities and usages differ. I believe the most natural and favorable position to be *on the back*, with the knees bent, and the feet propped against the foot-board of the bed. It is quite as common, however, for the patient to lie on her left side, with the limbs bent up, near one edge of the bed.

It is a help to many women to have strong towels or sheets tied to the bed-posts, the ends of which she can draw upon, during the bearing-down pains of the second stage.

What happens in this second stage? As already said, the most "normal" or favorable position of the child is with its head presenting downwards.

In the mechanism of natural processes, nothing is more wonderful in adaptation of means to ends, than that by which the developing embryo is accommodated within the uterus, and provision is made for its safe transit and exit, when mature, into the outer world.

Obstetricians speak,* in regard to head presentations, of several *positions;* according to the *direction* in which the back of the head projects. Also, they describe, as occurring in the second stage of labor, the successive movements of the descending head: *flexion* at the neck; *partial rotation; extension* as it emerges; and lastly, restitution after it has escaped through the outlet. All of these have to become familiar to the practitioner who is prepared to meet all the possibilities of labor. It must be remembered that while perhaps ninety in a hundred infants are born without anything amiss, or any occasion for interference by a physician, the other ten cases may be attended with serious complications. In some of these, without skilful assistance, the life of the mother, or of the child, or both, may be lost. Hence the importance, not always appreciated, of having professional attendance at the time of delivery; even though, in most cases, the doctor may have very little to do but *watch the case.* Such watching often enables him or her to shorten greatly the suffering of the patient, and in certain cases (which cannot be anticipated before the labor comes on) to save life.

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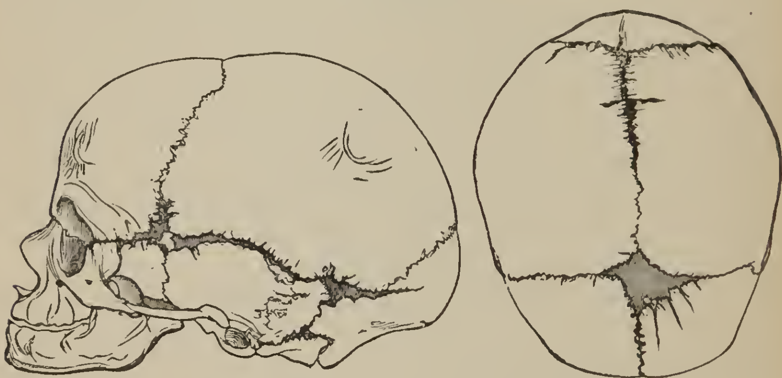
* See "Mechanism of Labor," in Hartshorne's *Conspectus of the Medical Sciences*, p. 959, etc.; or any work on Obstetrics.

We may point out a few of the indications by which, on examination with the finger-tip, the practitioner recognizes the presentation and position, during the second stage.

By its breadth, and hardness, the head itself is known; also, by its *sutures* and *fontanelles*. (See **Anatomy**.) The *sutures* are rough *lines*, easily felt; the *fontanelles* are spaces where the sutures meet. The *posterior* fontanelle is the one most desirable to find coming towards the central portion of the vaginal outlet. It is smaller than the other, and is made by the meeting of *three* suture-lines (see Fig. 207). The *anterior* fontanelle is larger, is on the top of the front part of the head, and has going out from it *four* suture-lines.

More unfavorable than the presentation of the occiput towards either side, is that of the *face*.

FIG. 207.



SKULL AT BIRTH, SHOWING THE FONTANELLES.

Subject to much uncertainty as to its progress, and requiring skilful management, is presentation of the *breech*.

Sometimes the *knees* or *feet* present, or a *shoulder*, or a *hand*. All of these, and their treatment, are described and considered, with their treatment, in professional works.

Through the second stage of labor, the nurse should promote the sufferer's comfort and encouragement, by all the attentions that intelligent sympathy will suggest. She may want her *back* to be firmly pressed during each pain. She had better not get out of bed during this stage, but she may find relief in occasional *changes of position*. Do not urge her to "bear down," as that will come of itself. Give her cold water to drink, if she wants it. If the labor is *long*, she may have a cup of hot tea for refreshment. It seldom lasts less than an hour, and may continue all day or all night.

When the *end* of the second stage is at hand, a critical part of it is

the stretching of the *perineum;* that is, the region just back of or beyond the lower part of the vulva (vaginal outlet). This may be *ruptured* if the force of the final pains, with a large fœtal head, be very violent; especially in a *primipara, i. e.* a mother in her first childbirth. *Support* may be, with great advantage, given to the perineum at this time. To give this support, as soon as any *bulging* there shows that the child's head is approaching extrusion, part of it having already passed out, proceed as follows: if the nurse (in the absence of a physician) has to act, without loss of time, let her choose such a position (according to that of the patient) as will enable her, with either the right or the left hand, to place the *palm* firmly upon the perineal space (including the *anus* or outlet from the bowel), her fingers being spread out over the distended vaginal outlet. Now, with each pain, *press,* with a force as nearly as possible *equal* to that felt by the hand, upon the region covered by the palm. For what? To keep it from being burst open, or rent, an accident which, if unavoidably it does happen, causes the patient great inconvenience and distress, often curable only by a surgical operation.

Another care must be taken by the nurse in the absence of the physician. Sometimes the umbilical (navėl) cord is around the child's neck, while it is being born. When this is found so, by gently drawing upon it, it will mostly be easy to *turn it off* over the head. If this *cannot* be succeeded with, let the cord at least be *loosened* from the child's neck so as not to strangle it; and then, the head being already delivered, it will be proper to *aid* the delivery of the shoulders and trunk, during each pain; first by a finger in the nearest armpit, and afterwards by drawing gently upon both shoulders. Much the greatest difficulty and delay always belongs to the *head* delivery, whether it comes first or last to the birth.

When the child is actually born, it should be laid down in a convenient position, with the face uncovered and the body protected by some light covering at hand—not so far from the mother as to stretch the umbilical cord.

Third Stage.

Now, the *placenta* (afterbirth) is to be detached from the uterus, as well as separated from the body of the infant. All through gestation it has been the means of communication, by which nourishing and aerated blood was given by the mother to the "fœtus," which, surrounded by fluid, could neither eat nor breathe, but lived much like an oyster, or like a silkworm or butterfly-pupa in a cocoon. With the beginning of respiration, the child has no farther need of this direct connection; the cord may be cut, and soon the womb then throws out the afterbirth

by its own contraction. It is well to promote this, by the nurse placing a hand upon the abdomen, and *gently compressing* the upper portion of the uterus. If it rapidly *shrinks in size,* and at the same time feels *hard*, that is all right. If it *does not,* but, in spite of gentle rubbing with the finger-tips, remains large, loose, and flabby, the placenta may be slow to come away, or, worse, there may be "flooding," *i. e.* hemorrhage.

Suppose there is flooding, at the end of either the second or the third stage of labor, and the doctor has not come; what is to be done? Keep up gentle rubbing with the fingers over the womb upon the surface of the abdomen. Send for ice, and pass a piece of it as large as a walnut slowly over and around the place where the womb is felt under the hand. Raise the pelvis (region of the hips) of the patient by a pillow placed under it. Dip a sponge in iced vinegar, or cut a lemon in two, and squeeze it high up in the vagina. If these measures fail, try, instead, *hot* vinegar and water (equal parts of vinegar and water *as hot as the hand can bear it*) in the same way. Besides all these things, as **wine of ergot** ought always to be within reach when labor is expected, give *half a teaspoonful* of this every fifteen minutes from the beginning of flooding, or even *without* hemorrhage, *if the womb does not contract firmly* after the childbirth has been accomplished. But a slight bloody flow must not be considered a hemorrhage. We call it such when the amount is to be estimated at least in teacupfuls; the patient also becoming pale, cold, and faint, with sighing, and a small though commonly rapid pulse.

It may be here noted (though not exactly in regular order) that whenever bleeding from the womb occurs during pregnancy *before the full time is up,* as in any month previous to the end of the ninth, medical advice should be at once obtained. It threatens either *abortion* (miscarriage) or *misplacement of the afterbirth* (placenta prævia); which is very dangerous, both to mother and child.

Mostly, in half an hour, more or less, the afterbirth will come away of itself. It must not be *dragged* out; gentle drawing upon the cord is all that will be safe. To pull hard upon it before it is separated from the womb might end in *inversion* of the womb; turning it *inside out;* a very ugly accident. Removal of an *adherent* placenta is an operative procedure to be ventured upon only by professional hands.

Meanwhile, the *cord* having been cut shortly after the child showed, by its cry, that it breathed, and was ready for an outside life, some one must give proper care to it. It must be rubbed all over with lard, sweet-oil, or vaseline; then all this and the material on the skin from the waters, etc., must be washed away with warm soap and water. A

soft rag will be as good as a sponge for this purpose; a bath-tub being ready in which to immerse the babe. Sponges are now banished from the lying-in room by many practitioners. No sponge ought ever to be used *twice* about a sick or wounded human body; and a lying-in woman may be regarded as both sick and wounded. Taking a fresh new sponge every time is expensive; and so soft linen rags, napkins, etc., will mostly answer best. These, after once using, must be either *burned*, or *boiled thoroughly* before being brought into the room again.

After well drying the infant, a two-inch square piece of linen may be pierced in the middle with scissors, smeared with vaseline or simple cerate, and put over the end of the navel-cord; which has been cut within about two inches of the child's body. Glancing backward, it may be here said, that it is best for the cord to be, in the first instance, *tied in two places* and cut between; unless, at least, we are quite sure there is not a *twin* babe still to come. Some practitioners consider the second tying best anyhow, as promoting the contraction of the womb by retention of blood in the placenta; but this appears to me very doubtful.

Suppose, however, that a child, when brought into the world, *does not breathe* Is it *still-born?* It may be; but perhaps not. Feel whether the umbilical cord *pulsates;* if it does, the child is not dead. Do not cut the cord in that case. Keep up communication with the mother a little longer, until the child has a chance to get breath.

Then, put a clean handkerchief-end, or something like it, over the forefinger, and pass it back over the child's tongue, to clear the mouth and throat of phlegm. Lay the child on its *right* side (for which there is a reason; see Physiology). Dip the end of a towel in cold water and slap its back several times with it. Have *hot* water put into the small bath-tub, and (when the cord has stopped pulsating, and has been tied and cut) place the child in that; and, while there, sprinkle cold water in its face. If it still does not breathe, use *artificial respiration*, thus: dry and cover it quickly, and then, holding its nose with a thumb and finger, take three deep breaths, and empty the lungs into the air fully as often; next, put your mouth over the baby's mouth, and *blow*, with considerable, though not excessive, force, into it, hoping thus to expand the lungs. Do this about twenty times a minute, which is a little oftener than your own natural breathing. Meanwhile, some one else may raise the child's arms over its head while you blow into its mouth, and, when you cease that, bring its elbows down and press against its two sides, to aid in expelling the air. Another way is to hold the child with your hands under its armpits, and swing its body and legs over your head and back again, repeatedly.

Once more returning to the mother; she must, after some minutes of partial repose (much longer if threatened with hemorrhage) be *cleaned up* by the nurse. Plenty of warm water and soap (to which may be added some one of the *antiseptic solutions* before mentioned; say a tablespoonful of it to a pint of water) must be used. Towels or napkins are to be (as already explained) preferred to sponges. After this cleaning, a large soft napkin should be placed well up between the thighs; the pelvis may be gently lifted, and the soiled sheet (and *upper* rubber-cloth, if there be two of them) drawn away, the clean sheet being then brought down under her. Lift her (without raising her head) into a comfortable position in the bed, place a long towel or "binder" around

FIG. 208.

BREAST SUSPENDED.

her body, and leave her for an hour or two of perfect rest. If it should be three or four hours, with quiet breathing and general appearance of comfort, so much the better. *After pains* are, if felt at all, likely to be later. They need not be the occasion of any treatment, unless uncommonly severe and long-continued. If so, half a tablespoonful of paregoric may be given at or after usual sleeping time, to relieve them and procure sleep.

Within a few hours, as a rule, the baby should be *put to the breast.* The first milk (colostrum) is laxative, and thus beneficial. The act of suction promotes the secretion of milk, which is good for both mother

and child. While the mother is doing well, every two hours, day and night, will not be too often for its nourishment. Gradually (as explained under **Hygiene of Infancy**) the time may be lengthened, first at night. A child five or six months old ought to be trained to sleep all night (at least six hours) without the breast.

Inflammation of a breast is least likely to happen when both of the breasts are in turn emptied by the infant. When a babe dies, the milk, if not at once dried up, should be drawn out at intervals with a *breast-pump*, so as to cease gradually to be secreted. The best thing to bathe a *hard* and *sore* breast (threatening inflammation and "gathering" or abscess) with, is *camphorated oil;* sweet-oil saturated with as much gum-camphor as it will take up.

Sore nipple is occasionally very troublesome. Let the nipples be always gently wiped dry with a soft napkin after suction. If at all sore, bathe with pure lime-water, equal parts with olive-oil, or paint with glycerin, equal parts with rose-water. A *cracked* nipple (very painful when touched) may be best treated by painting it (with a camel's-hair pencil) several times a day with *compound tincture of benzoin.*

Earlier than such breast-troubles, is the time for danger of *fever* to the mother. A slight rise of temperature, and moderate quickening of the pulse, commonly called "milk fever," about the third day, is not alarming. A *chill*, followed by *fever* with *very rapid pulse*, severe *pain* in the *abdomen*, and *stoppage* of the vaginal ("*lochial*") *discharge*, lead to a suspicion of the onset of *puerperal fever.* We will consider this hereafter, in its place among **Special Diseases.**

Prevention of puerperal fever is best secured by all the conditions and surroundings most favorable to healthy living. In a *pure atmosphere*, when *perfect cleanliness* is observed, and no possible communication exists with any other sick person, it is not likely to occur. It is a disease preëminently of crowded lying-in hospitals, and other uncleanly and ill-ventilated places.

Recovery after child-labor must be favored by quietness and a simple but nourishing diet. Such a patient does not need to be stimulated; neither ought she to be starved. Oatmeal gruel first, then milk and broths (chicken soup is the most delicate), and in a few days, if she have no fever, meals of solid food may be given.

Should a parturient woman sit up soon? No. Working-women often *have* to do so. I remember one patient of my own whom I saw at the washtub the day after her babe was born. She suffered, in consequence, a womb-trouble lasting for years. Those who can do so (and employers ought to make it possible for all) should *give nature time* for everything to be restored to its ordinary state. On a moment's thought,

any one may perceive that this cannot at once take place. The uterus, so long distended to many times its ordinary dimensions, must return gradually to these. Its internal surface, from which the placenta was detached, must heal, like a torn wound. The abdominal muscles and other tissues also have been stretched greatly by the fœtal growth, added to, somewhat, by its "bag of waters." They, too, must have time to shrink and regain their *tone* and elasticity. All these changes require time, and a mother is likely to do best, on the whole, who does not sit up in bed under three, four, or five days, and does not leave her bed for the traditional nine days at least. Delicate women may often require a longer time for entire recovery.

PART IV.

SPECIAL DISEASES.

IN order to make reference to this part of our book as easy and convenient as possible, an *alphabetical* arrangement will be used. **Accidents, Injuries, Poisons,** and **Sudden Death** will be treated of *after* our account of diseases has been concluded, making the *last* portion of this book.

My purpose now is to give a brief account of all the disorders upon which a general and unprofessional reader is likely to need information. Of these, some will require only to be defined, so that their names will be understood when met with. Others will be described, so as to be known when occurring in the family; and of these, the proper *domestic treatment,* in the absence of a physician, will be set forth. It should be understood that in many instances there are other remedies which are used by physicians, for the disorders spoken of, which it would not be safe for an unprofessional person to give or take without advice. For the *full* history of diseases and their medical management, technical works on the Practice of Medicine must be consulted.* For the *doses* and other particulars concerning the medicines mentioned in this section, see **Remedies** (pages 553, etc., and 615).

Abdominal Dropsy. This troublesome affection is called *ascites* in medical books. It may be a part of general dropsy, or it may occur by itself. We know its existence by the *swelling* of the abdomen evenly all over; *dulness* on *percussion* (tapping with the end of a finger) instead of the usual hollow sound there, and *fluctuation.* This last is got by placing a finger of the left hand upon the belly on one side, and then striking the other side gently with one or two fingers of the right hand. We feel the liquid sent with a *jar,* so to speak, from one finger to the

* See Flint's or Aitken's Practice; Hartshorne's Essentials of Practical Medicine; Reynolds' System of Medicine, American edition; American System of Practical Medicine; etc.

other. Very thick fat may cause a slight dulness on percussion; a tumor may give a very dull resonance; but in neither of these cases will there be *fluctuation*. This may be present in *ovarian* (encysted) dropsy; but, in that, the swelling is *not even all round*. It begins on one side, growing toward the middle. Moreover, in common abdominal dropsy (ascites) the intestines float above the water, making a place of clear resonance on percussion about the navel. In ovarian dropsy this does not occur.

Abdominal Dropsy is generally an obstinate complaint. Depending upon some disease already existing, of the *liver*, *spleen*, *kidneys*, or *heart*, or resulting as a part of general dropsy, from suppression (almost) of the *secretion* of *perspiration* and of *urine;* or, lastly, upon a thin and *watery* condition of the *blood*, it can hardly be cured while those morbid states exist; and they are often incurable. Still, an important amount of relief may always be for a time obtained, and some cases may be cured entirely.

Remedies for abdominal dropsy are: *diuretics, purgatives*, and *tapping*.

Diuretics are (as was said in giving an account of them under **Remedies**) uncertain in their action. Cream of Tartar, Juniper-berry Tea, or Compound Spirit of Juniper, Squills, and Watermelon-seed Tea, are the safest diuretics for family use.*

Purgatives used to get rid of water in the abdomen are, besides Cream of Tartar, Jalap, Rochelle or Epsom Salts, and (under advice of a physician only) in some cases Elaterium. Heavy purgation *weakens* a patient, however; therefore moderation must be used with it. The *strength of the patient* must be considered. *Tonics*, as Iron, and alteratives, like Iodide of potassium, sometimes aid in recovery from Dropsy more than diuretics and purgatives.

Tapping, of course, should never be undertaken by any but a professional hand. It is, simply, puncturing a small round hole in the water-swollen abdomen, and inserting in it a tube (*canula*) through which the liquid can escape. The puncture is made with a *trochar*. The place for it is not far below the navel. Some patients are tapped a number of times, to give relief to the *difficulty of breathing* (dyspnœa), from upward pressure of the water against the diaphragm (muscular roof of the abdomen, under the lungs and heart). This is the most distressing symptom of severe and continued Abdominal Dropsy.

Abortion. See Miscarriage.

Abscess. Every large "gathering," or inflammation followed by

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* For the *doses* of medicines mentioned in this section of the book, look back, under Remedies: page 615, and also, page 553 to 614.

suppuration (formation of matter or *pus*), may be called an abscess. A *boil* is a small abscess; a *carbuncle* a larger one; but abscesses are sometimes much larger than either of these. Such, of various magnitudes, may form in the *connective tissue* under the skin, in the jaw near a *tooth*, in the *tonsil*, in the female *breast*, after childbirth, in the *liver*, *lungs*, *brain*, etc. In *Pyæmia*, abscesses form in various parts of the body. They are not uncommon also after Typhoid Fever.

An Abscess is usually painful from the start, with tenderness to the touch, showing *inflammation*. When *suppuration* occurs, there is usually a tendency towards "pointing," that is, softening of the skin (or of some internal tissue), and *yielding*, at last, of the surface, so that the Abscess "breaks," and the pus escapes. When this takes place at the outside of the body, or into the mouth, throat, or alimentary canal, relief is obtained safely, and recovery may be expected to follow. But when it opens into the cavity of the *pleura*, outside of a lung, or into that of the *peritoneum* in the abdomen, much trouble is likely to result.

It is often good treatment to *anticipate* the spontaneous opening of an Abscess, by opening it with a surgical knife. Only a professionally trained judgment should determine when this is proper, and none but a surgeon or a physician ought to venture to perform such an operation. If unskilfully done, a *tumor*, or an *aneurism* may be cut into instead of an abscess; in the first case doing no good, in the second, endangering life by escape of blood. This last accident may attend the opening of a real abscess, if the knife happens to slip to one side, or to penetrate too far.

Whenever, therefore, the signs of an Abscess of any part appear, medical advice ought to obtained.

It may be briefly mentioned, that some physicians have confidence in the effect of the early internal use of *Sulphide of Calcium* (gr. $\frac{1}{10}$ to gr. $\frac{1}{4}$ three times daily) in preventing threatened suppuration of an inflamed part; and that among the alleviating *external* applications employed for commencing Abscesses, *Belladonna ointment*, and *Iodoform mixed with Vaseline*, are important to be remembered.

Addison's Disease. A rare chronic affection, in which the skin all over the body assumes an appearance like *bronze*. After death, the most notable change found is, evidence of disease in the small bodies at the tops of the kidneys, called the *supra-renal capsules*. (See works on Practice of Medicine for a further account of it.)

Ague, also called "chills," or chills and fever, and *Intermittent Fever*. Certain neighborhoods furnish many cases of this; some parts of the world have never known it. It is a disease of the *country*, especially in marshy regions, and on the banks of sluggish streams, on all the continents. Warm summers are necessary to its existence. It is pre-

eminently a disease of *seasons, autumn* especially, but also spring. No new cases originate after the first hard frost of early winter. Patients already affected, however, may, if not successfully treated, have their chills to continue all through the winter. One attack does not lessen, but rather increases, the individual's liability to the disease on exposure.

Any one can recognize Ague when he sees it all through a *paroxysm*. First comes the *chill* or cold stage. Weakness, dulness, headache, sick stomach, pain in the back and limbs, a *feeling* of coldness (though the skin may not be cold to the touch), with *shivering*, and paleness of the face, and blueness of the lips and finger-ends: these are the symptoms.

After a half-hour, an hour, or two, seldom more of the chill, comes the *fever*. Now the skin grows warmer, the face is flushed. Headache is severe; the pulse is rapid, the temperature becomes hot; with dryness of the skin and mouth, and thirst; the bowels are constipated, and very little water is passed from the bladder. From two to four or five hours may be mentioned as the usual length of the hot stage.

By degrees, the skin grows moist and cools down; the pulse slackens; thirst and headache diminish; and then the *sweating* stage comes on. With this there may be a copious discharge of urine. Thus ends the attack or paroxysm.

A chill, with its following hot and sweating stages, may come *every day*, when it is called a *quotidian* intermittent; or *every other* day, named a *tertian*. Both of these are about equally common. After the third day, the *seventh* day is the most likely time of recurrence of a chill; once a week. Other periods are mentioned in medical books, as now and then met with; but they are rare.

Hardly any disease has so well-determined and reliable a method of *treatment* as ague. Since the Countess of Cinchon learned in Peru, and made known to the physicians of Europe, the virtues of Peruvian Bark, the world has possessed a *true cure* (very seldom failing) for this malady. The alkaloid principles, Quinia, Quinidia, Cinchonia, and Cinchonidia, have all the needful powers of the Bark, in much smaller doses than the Bark itself, and more acceptably to the stomach.

Quinine is the sulphate of quinia. It is most generally depended upon; although sulphates of the other alkaloids named (and also quinoidine and dextro-quinine) will almost always succeed.

If obliged to act, in the absence of a physician, in the care of a case of Intermittent, begin with quinine as soon as the sweating stage has fully come on. Many physicians give it in five-grain doses. My experience leads me to consider it better to give *one grain every hour* (while awake), or two grains every two hours, until at least *fifteen* or *sixteen grains* have been taken before the time when the next chill might

be expected. Under this dosing, that chill *will not come*, in at least ninety-nine out of a hundred cases.

Then, the next day, let the patient take *twelve* one-grain, or six two-grain, quinine pills, or teaspoonfuls of a *solution* of quinine, eight grains to the fluidounce of water, with sixteen drops of *aromatic sulphuric acid* in each fluidounce. The acid is added to *dissolve* the quinine perfectly.

Each day let one grain of quinine less be given; until the *seventh* day. On that day, *ten* grains should be given. If no chill has yet occurred, then *six* grains every day for two weeks will suffice. Most fresh cases will thus be cured; unless the patient *lives in a malarial region*, and no frost has yet *killed*, for the year, the local cause of the disease.

But repeated exposures and attacks may *fasten* the *habit*, so to speak, of having chills upon a person; that is, *chronic* intermittent. Quinine, in such cases, will *break* or interrupt the succession of paroxysms; but in three or four weeks they come again. What are we to do now? Give quinine as usual, so as to break the chills; and then begin at once with *iron*. It is a *blood-medicine*, and the blood is injured in malarial attacks. Let the patient take three pills every day for a month (or, if pale and weak, longer), each of which contains *three* grains of *Vallet's mass of carbonate of iron*, and *one* grain of sulphate of quinia (quinine). Outside of a positively malarious district, this will very seldom (I have never known it once) fail to cure the complaint. It will not pay any one to *remain* as a resident in a place where he has contracted a chronic intermittent. It clings to one like the Old Man of the Mountain in "Arabian Nights." Better sell your beautiful country place, or give up your salaried business position, and move somewhere else, rather than be run down to a skeleton and have no enjoyment of life.

Among the many *substitutes* for Quinine proposed and used in treatment of Ague, French authorities assert the power, next after the alkaloids of Peruvian Bark, of green or unroasted *Coffee*, made into a tea by boiling (decoction), and taken freely a few hours before the expected time of a chill. I have had no experience with this, which I think is hardly known in American practice.

Albuminuria. Presence of *albumen* (tested chemically) in the urine. *Bright's Disease* is principally recognized by this symptom. But there is often albuminuria without Bright's disease, and sometimes (not often) Bright's disease without constant albuminuria. Scarlet fever, diphtheria, and several other disorders, frequently have in their course that alteration in the condition and action of the kidneys which produces albuminuria.

Alcoholism. A general name for the results of intemperance;

especially applied, however, to the slow poisoning and degeneration of the great organs of the body, *liver*, *kidneys*, *heart*, and *brain*, which end in ruin of the health and premature death. If these are not *prevented*, by abstinence or early reform of habits, they are *not curable by medicine*, and are very seldom recovered from. That is, after "gin-liver," or diseased kidneys, or a fatty heart, or an impaired brain, has shown that the fell destroyer has set his brand upon the victim of excess, it is too late to restore perfect health in any way. Even then, reformation may greatly prolong life. At *any* stage, *withdrawal* of alcohol is imperatively demanded. Anything is better than to die drunk.

Alopecia. Baldness. (See Care of the Hair, under **Hygiene.**)

Amaurosis. A name, not now much used by physicians, for *blindness* depending on disease or failure of the optic *nerve* or its centre in the *brain*. Milton's blindness was of this kind.

"So thick a drop serene hath quenched these orbs."

Gutta serena was an old name for it; given because, unlike cataract and some other causes of blindness, it does not show, on looking at the eye, without the aid of an instrument (ophthalmoscope).

Fig. 209.

OPHTHALMOSCOPE.

Amblyopia. *Dimness* or cloudiness of sight, short of blindness. The degree of this may vary in the same person, at different times. It is an important symptom, showing that the eyes are threatened, and must be taken great care of; but it does not necessarily end in blindness.

Amenorrhœa. Absence or suppression of the menses or monthly uterine flow. Exposure to cold and wet, or mental agitation, may *interrupt* the menstrual process, after it has begun, or *prevent* it, when it is about to come. In such a case, rest and warmth, hot mustard foot-baths, or warm hip-baths, may renew it.

Habitual absence of menstruation, one month after another, may occur under several circumstances. Weakening *chronic disease*, as pulmonary consumption, may be attended by it. *Anæmia* (poverty of blood) has to do with it in the greater number of instances. Occasionally it is met with in plethoric (full-blooded) women. Married women, or any who become pregnant, have cessation of the menses as the first usual sign of that condition.

How great a degree of injury or inconvenience will result from Amenorrhœa, must depend on its *cause* chiefly, and on the state of the general system. A full-blooded woman may suffer with headache, and have risk of congestion of the brain. (*Apoplexy* is rare until after the time of the natural "turn of life," when menstruation has ceased.) In an *anæmic* subject, the poverty of blood appears to be the *cause*, not the effect, of the irregularity.

We are first to be sure that pregnancy is not present. If it is, it is unsafe to interfere. Abortion may be forced, but at the risk of the patient's life. (See **Miscarriage.**) Then, we ascertain whether she is *plethoric* or *anæmic*. If the former, a low diet, purgative salts (p. 527,) and perhaps cut cups to the small of the back, will be suitable. Some will even gain by loss of blood from the arm. In the *great majority* of cases, the patient is pale, weak, and nervous. Such a one needs *iron* and nourishing food, with mental ease and tranquillity, and change of air—everything to *build up* the system.

When *delay* gives trouble, for one or more months, we advise (as above indicated) that at the time the change is due, a *hot mustard foot-bath at bedtime* be tried. If that does not suffice, the next night a *warm hip-* or *sitting-bath* may follow. Also, let there be taken a *Lady Webster pill* at night, or a teaspoonful of *Elixir Pro.*, or two teaspoonfuls of Warner's Cordial. Either of these will be most apt to do good when taken in hot water. A physician may advise permanganate of potassium, in one- or two-grain doses.

Of all classes of medicines, even more than diuretics, *emmenagogues* (those intended to renew suppressed menstruation) are the most uncertain. For others than those above mentioned, we must refer to extended medical books.

Amyloid Degeneration. This is one of those morbid changes to which the liver, kidneys, and other organs are subject, when the constitution has been impaired by any cause. There is in the organ affected a change of a part of its natural tissue into a *starch-like* (amyloid) material, incapable of doing the duty of the healthy organ. There is no cure for such an affection, but its progress is usually very slow, and its symptoms not marked until it has continued for a long time. Often it is scarcely recognizable, if at all, until discovered by *post-mortem* examination.

Anæmia. Poverty of blood. This may be brought on (besides being *predisposed to* from birth in some constitutions): 1, by loss of blood, from disease or injury; 2, too long suckling, in a mother or wet-nurse (especially with twins, or one's own babe and another's); 3, severe continued diarrhœa; 4, typhoid or some other fever; 5, malarial influence,

in an unhealthy locality; 6, deficiency of food, warmth, light, and fresh air, in crowded and unhealthy parts of towns or villages.

Signs of Anæmia are paleness, thinness of body, weakness, nervousness; sometimes palpitation of the heart. In extreme cases, the lips are white, and the tongue thin and almost colorless.

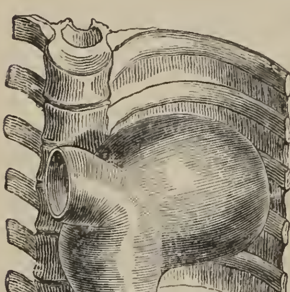
Treatment of this condition requires good nourishing (not necessarily stimulating) food, of which a considerable part should be *animal*. Beef, mutton, chicken, game, fish—if there is appetite and digestion for them; if not, beef-tea, strong chicken-broth, etc.; milk rather than tea or coffee; *variety* of food, but no unprofitable dainties of any kind. *Iron* and *cod-liver oil* are the stand-by medicines for Anæmia. In some cases physicians give arsenic, in very small doses. Change of air, sea-bathing, and mineral waters containing iron, all may contribute to recovery.

Pernicious Anæmia is an almost or quite incurable, but rare affection. Upon this, see *Essentials of Practical Medicine*, or some other extended medical work.

Anæsthesia. Loss of sensibility. *Anæsthetics* are agents which, like chloroform, ether, and nitrous oxide, when breathed, take away for the time all feeling, so that surgical or dental operations may be performed without pain. See page 522.

Paralytic anæsthesia is common in cases of palsy, being confined to *one side* in *hemiplegia*, to *both lower limbs* in *paraplegia*, and extending to all the extremities in general paralysis.

FIG. 210.



ANEURISM OF AORTA.

Anasarca. General dropsy. It may result from exposure to cold and wet, checking suddenly the action both of the skin and of the kidneys. Diuretics and purgatives are the medicines appropriate to it. (See **Remedies**, under the heading **Dropsy**, page 548.)

Aneurism. An enlargement of a part of an artery, from bursting of its inner and middle coats, making a *sac* by stretching the outer fibrous coat. In this sac a portion of blood coagulates solidly. This may happen on any artery. The most serious of all Aneurisms is that of the *aorta* (largest artery of the body), in the chest or in the abdomen.

Aneurism of the *thoracic* aorta (that is, of the part of the artery within the chest) is known by a *bulging*, slowly increasing, in front of the chest, in which a *pulsation* may be felt, apart from that of the heart;

dulness on percussion over the bulging; a *thrill*, sometimes, felt when the finger is placed there; and signs of inward *pressure*, on the windpipe, causing *cough;* on the *œsophagus* (gullet) producing difficulty in swallowing. *Pain* also occurs in the middle of the chest; increased by muscular effort or active movement.

When the *abdominal* aorta is the seat of the enlargement, no bulging exists, but a *pulsating tumor* may be felt, if the hand is firmly pressed upon the middle of the abdomen. *Pain* is in some cases constant, in others varying from time to time; increase of it results from any considerable exertion.

It is important to know that, in some cases of dyspepsia, the aorta pulsates with more or less violence, without any aneurism. Also, pain in the belly may be accounted for instead by colic, gall-stone, stone in the kidney, etc. Therefore much care is necessary in making out the *diagnosis* of Aneurism.

This affection is a very difficult disease to treat, with any hope of benefit. Quietness of body and mind is very important. A simple diet, of milk and other easily digested, not stimulating, food, will be best. *Iodide of potassium*, continued in moderate doses for a long time, appears to have done good in a number of cases. *Electro-puncture* has been used with success by several practitioners.

The progress of aortic Aneurism is slow; occupying generally several years before its fatal end. Death comes at last, from either *sudden breaking* of the sac and exhaustion by hemorrhage; or *leaking* of the sac and gradual exhaustion; or *wasting* of all the strength by the pressure interfering with breathing, swallowing, digestion, etc.

Aneurism of other arteries is met with not infrequently. At the bend of the elbow, it has occasionally followed an accidental wound of the artery there in the operation of opening a vein (bleeding, venesection). Elsewhere, disease in an artery may result in bursting of its inner coats; the outer coat then bulging out, and a clot forming in the swollen portion of it. Such a tumor *throbs* or *pulsates*, with more or less force according to the size of the artery and of the swelling. Thus there may be a *brachial* or a *popliteal* or a *femoral* aneurism, etc., according to the part in which it is formed.

For these different aneurisms, *surgical* treatment is often resorted to; *tying* the affected artery, either above or below the tumor; or applying continued *pressure* upon the vessel, for a number of days and nights together. (See works on **Surgery.**)

Angina Pectoris. A disease consisting of attacks of severe pain about the heart, extending along the left arm. It seems to be a kind of neuralgia of the heart; connected in many, but not all instances, with

some change in its structure. Rarely, the first paroxysm is fatal. Mostly, many attacks occur, at variable intervals, of months, weeks, or days; in any of which it is possible for death to result. Dr. Chalmers, of Scotland, the eloquent minister and writer, and Dr. Thomas Arnold, of Rugby, died of this disorder. It seldom, if ever, affects young people, and is more common in men than in women.

For the relief of attacks of Angina Pectoris, many medicines have been tried. Among those doing good are *Hoffmann's anodyne* and *laudanum;* also, tablespoonful doses of whisky. But the most effective seems to be breathing a few drops of *nitrite of amyl*, just at the time of the attack. This is a powerful, even dangerous agent, to be used with extreme caution.

A mustard-plaster over the chest or between the shoulders, and a hot mustard foot-bath, will be suitable, if a paroxysm lasts long enough to allow them. It is generally over, however, in a few minutes.

Anorexia. Loss of appetite. This is common in *all acute*, and *most chronic* diseases. It occurs also when no disease can be said to be present, other than want of tone in the stomach or in the general system. Besides improving the surrounding conditions, of air, light, cheerfulness, etc., we may use as appetizers such medicines as *chamomile tea, quassia, gentian, fluid extract of wild cherry bark, aromatic sulphuric acid;* or, if anæmia is present, some preparation of *iron*. (For doses of all these, see **Remedies**, page 514, etc., and page 615.)

Anthrax. See **Carbuncle.**

Anus, Fissure of. A very painful *crack* or furrow at the edge of the outlet from the lower bowel. It is most common in middle life. At first, there is a smarting at one spot, when the bowels are moved. This afterwards becomes more severe, with burning, aching, and sometimes throbbing at the part, lasting for an hour, or even several hours at a time. Coughing, sneezing, or in bad cases even sitting on a hard surface, will bring on the pain.

For its *treatment*, soothing ointments may be first tried; simple cerate, ointment of oxide of zinc, iodoform ointment; or washing the parts every morning with castile soap and water. Dusting with iodoform powder will be good, especially for a large old fissure. So will *painting* (with a camel's-hair pencil) upon it *collodion*, to which a very little glycerin has been added; or, used the same way, *compound tincture of benzoin*. This last should be applied at least twice every day; the last time on going to bed at night. Touching the sore lightly with a crystal of *blue stone* (sulphate of copper) will promote the cure, if it comes slowly; or with *nitrate of silver*, more carefully.

When the attacks of pain are *excessive*, a one-grain *opium suppository*

may be introduced into the bowel, immediately after a passage. This had better, however, be avoided, if possible, as it tends to produce costiveness, which rather aggravates the trouble.

There are surgical operations in use for obstinate cases of this affection, for which we must refer to works on Surgery.

Anus, Prolapsus of. This is a falling out or protrusion of a portion of the *rectum*, or lower bowel, from straining at stool. Children not unfrequently suffer from it, especially in warm countries. The bowel will sometimes go back of itself, but in many cases requires to be pressed back gently, with well-oiled fingers.

To *prevent* this inconvenient and sometimes distressing accident, *straining* should be discouraged, and made unnecessary by care to keep the bowels regularly and moderately open. A *high* seat will be less promotive of Prolapsus than a low one or chamber-vessel.

If, when it occurs, moderate pressure does not succeed in replacing the bowel, send at once for a physician.

Aorta, Aneurism of. See **Aneurism.**

Aphasia. Loss of language, from brain disorder. In most, but not all cases, palsy of the right arm and leg (right hemiplegia) accompanies it. In some instances the patient cannot say any words at all; in others he gets the wrong words, talking only nonsense. Recovery is not to be *expected* from this rare affection, but several restorations from it have taken place. It may continue with but little change for years.

Aphonia. Loss of *voice;* quite different from *aphasia.* It depends upon an impairment of the healthy condition of the *larynx,* organ of voice; either a *thickening* of the vocal *ligaments* (as from a severe cold), or worse, a *paralysis* of the vocal *muscles.* Both are often temporary; the last named being the longest continued, though sometimes suddenly passing away. Electricity is one of the remedies employed for it by physicians.

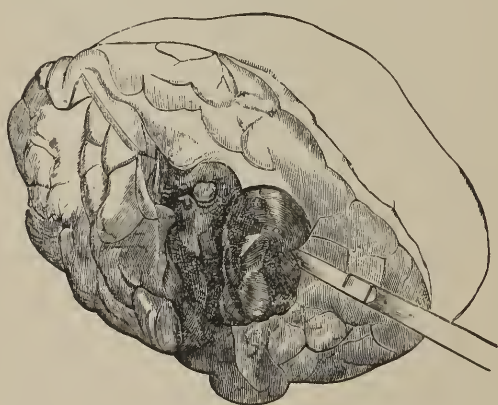
Aphthæ. Very small ulcers, with whitish surfaces, in the *mouth;* most often seen in young children. *Chlorate of potassium* is a proper medicine and local application for these, but it must not be swallowed without limitation. In very large (dessertspoonful or tablespoonful) doses, chlorate of potassium is poisonous. It is, however, safe in doses of two to five grains for a child, and ten to twenty grains for an adult. A powder of *prepared chalk* and *gum-arabic*, or a paste of *glycerin* and prepared chalk, may be applied frequently to the little ulcers. *Borax* and white sugar make a favorite nursery application; no better, however, than the above, if so good.

Apnœa. Loss of breath. When complete, it is a mode of death. *Difficult* respiration is *dyspnœa* (which see).

Apoplexy. Brain-stroke, either from rupture of a blood-vessel within the brain, causing pressure by a clot of blood, or from an extreme *congestion* of the brain; that is, *excess of blood* in its vessels. Both of these, by pressure, cause *stupor; coma.* The patient falls or lies unconscious, with a *flushed face, hot or warm head, full slow* pulse, and *snoring respiration.* If he regains consciousness, *palsy* of some part, as an arm and leg, or the organs of speech, or the muscles of one side of the face, remains. The first attack is very often fatal, either at once or after some hours or days. A second is still more likely to end life; a third is seldom survived.

What is to be done when an attack of apoplexy occurs? As above described, it is altogether different from *fainting* (syncope). In that,

Fig. 211.



APOPLECTIC CLOT.

the head is cool, the face pale, the pulse absent or almost so, the breathing feeble or stopped for the moment.* We are, then, when we find a person falling unconscious with a *flushed face* and a *full pulse,* to place him in a *reclining* posture, with *the head raised.* Put a handkerchief wet with *cold water* upon his forehead or all over his head, and wet it afresh every few minutes; meanwhile, some one having *gone for a doctor.* Never undertake, without medical knowledge, to deal with so grave a disorder as apoplexy. So, with the doctors we may here leave our supposed patient, so affected.

I will only remark here (before the doctor comes) that the practice of *bleeding* from the arm in *every* case of apoplexy has ceased to be universal with physicians. Under a reaction from the "Sangrado"

* *Mixed* attacks are now and then met with, in fatty degeneration of the heart, having some of the features of syncope and some also of apoplexy.

practice of fifty years ago, some even omit the use of the remedy in all cases. I believe a *medium* to be justified. When a patient over seventy years of age, of known feebleness of system, is so attacked, we may be almost sure that *degeneration of the blood-vessels* of his brain has resulted in a hemorrhage therein, which cannot be undone by taking blood from the arm. But when the attack occurs in a younger person, especially before sixty, it is always possible that *extreme congestion* (accumulation of blood) of the brain occasions the symptoms of brain oppression. For this, *bleeding* is a most *rational* and often effective remedy. It may, in such cases, save life, by diminishing the pressure upon the brain; and it may be helped by cups to the back of the neck, mustard-plasters to the lower limbs, and purgative medicine (by the mouth, if it can be swallowed; if not, by injection into the bowels).

Arcus Senilis. A whitish or pearly opaque arch or ring around the cornea of the eye, seen often in old people, and considered a sign of approaching or commencing *fatty degeneration.* Some of them, however, live a good while after its appearance.

Ascites. See **Abdominal Dropsy.**

Asphyxia. Suffocation. It may be caused by choking (as by hanging, etc.), or by gases which cannot be breathed. For its domestic *treatment,* see the last part of this book, under **Accidents,** page 871.

Asthenopia. Weakness of the eyes, shown by a sense of fatigue and dimness of vision after using the eyes awhile in reading or work. It requires **rest** for the eyes; with other treatment, according to the judgment of special oculists.

Asthma. Paroxysms of great difficulty of breathing. They come on mostly late at night, and last from an hour to a dozen or more hours; generally not more than three or four hours. Some patients have an attack every night; others at long and irregular intervals; some only when they breathe certain vapors or odorous substances. *Hay* asthma is one of the names for "summer catarrh," which a certain number of people have at the same time every year.

The attack of ordinary asthma is often very distressing. The patient sits up, leans forward, goes to the window, toiling and striving for breath. Death scarcely ever takes place during the paroxysm. At last, secretion of phlegm occurs in the air-tubes, the spasm relaxes, and relief comes.

Treatment, in the absence of a physician, should have the aim of promoting relaxation and mucous secretion. As this affection (like all spasmodic disorders) has its *nervous* element, *Hoffmann's anodyne* often does good. Syrup or wine of ipecacuanha, half a teaspoonful, with from a quarter to half a teaspoonful of *tincture of lobelia,* every half hour until relief is obtained or until the stomach is sickened, will

almost always shorten the paroxysm. *Smoking* cigarettes made of paper dried after being saturated with a strong solution of *nitre* (nitrate of potassium, saltpetre) relieves some patients; *stramonium* papers burned in the room have still more power with others. A hot mustard foot-bath, and a mustard-plaster between the shoulders, will assist the treatment.

To make Nitre-tablets: Saturate a half pint or so of water with alternate teaspoonfuls of nitre and chlorate of potassium. While this solution is being brought to a boiling-point on a fire, cut up some blotting-paper into pieces six inches square. Pile these, six together. Dip each pile well into the boiling solution of nitre and chlorate of potass.; then pour on it one-quarter drachm of spirits of camphor. Dry. For use, fold a *pile tent-wise*, /\, and light it at one or both ends, on a shovel or other metallic surface. It makes a dense smoke.

For Nitre Cigarettes: Put a teaspoonful of nitrate of potassium in half a glass of pure water and let it dissolve; and then add more till it is saturated. Soak in this solution strips of unglazed, thick paper, or blotting-paper, of such shape as would be used to make "lighter-papers"; and dry these in the sun, or near a fire. Then roll them up, when dry, lighter-fashion—for Asthma, burning as cigarettes.

In feeble patients, strong coffee may aid in relieving attacks of asthma.

Prevention may be maintained in some cases, by finding out and avoiding the conditions that bring on the attacks. These are wonderfully various. Some always suffer if they sleep on a first floor; others do better there than higher up. Some never have asthma when at the sea-shore; others are worse there with it than elsewhere.

Hay asthma, Hay Fever, or Summer Catarrh, is a disorder peculiar to a not very large number of persons, many of whom have otherwise fair health. It does not affect them all at the same time, but it always occurs during the warmer half of the year. Pollen of flowers, seeds of grasses, dust of different kinds, etc., in the atmosphere, have been supposed to have to do with it; but its causation is as obscure as its cure is difficult. Indeed it may be confessed that the art of medicine is, so far, mostly baffled by it. Palliation is all that quinine, various expectorants, inhalations, and local applications to the throat, have succeeded in obtaining. The most important fact is, therefore, that *some places afford security from it* to all or nearly all its victims.

A convention of those who are subject to this malady is held every year in New England. From a report to this convention by Dr. Morrill Wyman, the following extract is taken.

"Long and varied experience with numerous individuals has proved that in New Hampshire, the Glen, Gorham, Randolph, Jefferson, White-

field, Bethlehem Village, the White Mountain Notch, Twin Mountain House, the high level about Franconia Notch, are all within the limits of safety. Other elevated tracts are safe. Mount Mansfield, at Stowe, Vermont, and the Adirondacks, are particularly safe, also the Ohio and Pennsylvania *plateau* (high table land), including the high range of southern counties in New York, from the Catskill Mountains to the western border of the State; the plateau in these counties having an elevation of two thousand feet above the sea." "The Island of Mackinaw, and the country north of the great Lakes in Canada, and beyond the Mississippi, at St. Paul, Minnesota, have a certain immunity, but not equal to that of the Lake Superior region. Farther west are large tracts that may be resorted to. South, the Allegheny Mountains at Oakland and other elevated points, and Iron Mountain, on the Tennessee and North Carolina line, are unusually free. To the east, the elevated interior of Maine and its extensive lakes afford both pleasure and safety. Mount Desert is not free, but some of the islands about it are thought to give relief. If the sea-coast is preferred, the whole coast east of the St. John, thence quite around to Labrador, is open to the subjects of autumnal catarrh. Sufferers who actually pitch their tents in these favored regions, as a general rule, not only escape their enemy, but may find themselves at the end of the month with a vigor that nothing but living under canvas seems to give."

Astigmatism. Uneven sight, from the cornea of the eye (or eyes) being *spoon-shaped* instead of spherical. It is corrected by wearing glasses made of a *cylindrical* form; just reversing the error of the eyes. See *Care of the Eyes*, under **Hygiene**, page 403.

Ataxy, Locomotor. A chronic and long-continuing affection of the spinal marrow, in which the patient loses, to a considerable extent, the control of his lower limbs. Each step is made with a sort of jerk forwards, of one foot after the other. Severe *pains* in the legs are common, at variable intervals. These, with gradually increasing weakness, are the characteristic symptoms. The disease is slow in progress, often lasting many years; but recovery is not to be expected. For palliative treatment, see extended medical works. Any one suffering from this disorder should be under the care of a physician.

Atheroma. A mode of degeneration of the arteries, rendering them liable to rupture, causing hemorrhage. If this happens in the brain, apoplexy is the consequence.

Athetosis. An unusual nervous disorder, in which the fingers and toes, on one side or both, are in constant, involuntary, and more or less regular movement. It often, but not always, is preceded by palsy of the side on which the extremities are most affected.

Baldness. See **Alopecia**; and *Care of the Hair*, under **Hygiene**, page 346.

Barbadoes Leg. See **Elephantiasis.**

Bedsores. See **Nursing**, p. 628.

Bilious Fever. See **Remittent Fever.**

Biliousness. A term of vague meaning, and often misused. Many people say they are bilious, when they have mere indigestion. There is a condition of disorder of the liver, to which such a name may be given; when one or both of two things may be present. One is *deficient secretion* of the liver; the materials which it ought to remove from the blood being left in the blood, and finding their way out through other secretions. The other is, *obstruction of the gall-duct;* the collected bile being reabsorbed into the blood; then, also, afterwards escaping by the kidneys, as well as in the perspiration, and in the secretion of the mucous glands of the mouth, etc.; when the amount of bilious coloring matter is great, *staining* the skin, eyes, and tongue, *yellow* (jaundice). At such a time, the passages from the *bowels*, instead of being yellowish-brown, are slate-colored, or nearly a dull white; the *urine* being dark, sometimes like porter, loaded with the coloring matter of the bile. This is because the bile is withheld from its natural course into the bowels, and is, instead, thrown off largely from the blood by the kidneys. A third kind of disorder may be, an *unhealthy condition* of the bile secreted; and in sea-sickness, and possibly in some other instances, still another—the *pouring back* of an excess of bile from the duodenum (first part of the small intestine, into which the bile is conveyed by the biliary duct) *into the stomach.*

Signs of liver disorder, at an early stage or in a transient attack, are: sickness of stomach, generally without pain or vomiting, headache, dizziness, especially on turning the head or the eyes; constipation of the bowels, with slate-colored stools; a bitter taste in the mouth, especially on waking in the morning; yellowness of the whites of the eyes, the surface of the tongue, and, in a marked case, the skin; pain in the right side near the edge of the ribs, or under the right shoulder-blade. *Treatment* of this condition includes a simple and rather spare diet, of only easily digested food; toast and tea, oatmeal gruel, chicken or other broth well skimmed of all its fat, etc. Of medicines, for home use, *magnesia* is especially suitable, a full teaspoonful (if the bowels are, as is usually the case, not free) thoroughly mixed in a wineglassful of water, or in a tablespoonful of spiced syrup of rhubarb. *Blue pill* is the "auld lang syne" remedy for biliousness. I believe fully, from often repeated observation, in its efficiency; but it is not a medicine to be carelessly and promiscuously used. The practice of fifty or sixty years ago, of taking

ten or twenty grains of blue mass at random for every little attack of indigestion, has now, happily, gone out.

When, however, the symptoms above described are present, it will be appropriate to take at least three grains of blue pill; best one grain at a time; a one-grain pill at bedtime, the next morning, and then at bedtime again. If the "bilious" symptoms are not relieved by this and magnesia (or, when constipation is very decided, *citrate* of magnesium, Tarrant's powder, Seidlitz powders, or Rochelle Salts), it will be well to continue smaller doses of blue mass for several days. For this purpose, three daily of *Compound Gentian pills* (each containing one-quarter grain of blue pill, with one grain each of extract of gentian and rhubarb, and one-fifth drop of oil of cloves) will be convenient and serviceable.

Bladder Disorders. Of these, the most common are *Retention* of urine, *Incontinence* of urine, *Stone*, *Gravel*, and *Inflammation* of the Bladder (cystitis). On all but the last of these, something will be said under the heads named hereafter.

Inflammation of the Bladder is a not common but very distressing malady. It may be *caused* by blows or other injuries; by the presence of a large stone (calculus) or small solid particles (gravel); or by an obstruction (stricture) of the urethra (outlet from the bladder) inducing retention of urine, which undergoes decomposition. *Symptoms* of this inflammation are: pain, and soreness on pressure, in the bladder; frequent desire to pass water, with disposition to strain, and burning in the urethra when it is passed. In an acute case, there is often fever, perhaps with irregular chills. *Bad* cases have also sick stomach, delirium, cold perspirations, and bloody urine containing pus, with a fetid odor.

No unprofessional person should, if possibly avoidable, undertake to treat such a disease. All that is in place here to mention about its home treatment is, that the patient must, in *acute* Cystitis, remain quiet in bed; with milk, gruel, arrowroot, rice, etc., for diet; flaxseed tea (iced, if agreeable), between whiles as a drink; a large warm flaxseed or mush poultice, with laudanum added to it if pain be great, may be kept (covered with oiled silk) upon the lower part of the abdomen. If the patient can be moved without suffering, a warm whole bath or hip-bath daily will be relieving; and if pain be very distressing, a one- or two-grain opium suppository may be inserted into the bowel at bedtime every night.

Bleeding. See **Hemorrhages.**

Blindness. See page 725.

Boils. A boil is a small abscess. It begins as a red, sore, and roundly swollen rising, on any part of the body. It increases moderately in size; becomes more and more painful and tender, as well as

red, for two, three, or more days; and then points, growing yellow and soft at one spot, generally near its centre. This will in time break and discharge, if not opened. At the heart of it there is a small dead mass, called the "core." Some persons are often troubled with Boils; others never have them. Now and then we meet with *attacks*, in which one may have two, or three, or four of them at a time, and crop after crop, almost all over the body, lasting even for weeks together. This may be confessed to be an *opprobium* of medical art; for no certain means of cutting short such attacks have yet been discovered.

Some physicians have confidence in the internal use of *sulphide of calcium* (one-tenth to one-quarter of a grain two or three times daily) as a means of arresting a tendency to suppuration, whether in boils or in larger abscesses. It is worth trying, but is as yet far from being an established specific for this purpose.

The *treatment* of single Boils is tolerably simple. If anything will "nip in the bud" a beginning one, it is either *a piece of ice*, held to it almost constantly for an hour or so, or *spirits of camphor*, freely applied at a very early stage. When it is clearly going on, a *bread and water poultice* will soothe it best; covering the poultice with oiled silk, oiled paper, or rubber-cloth. Near the time of its coming to a head, a *flax-seed* poultice will most hasten the softening of the skin, making way for the breaking or opening for the discharge of pus.

Should a Boil be opened, with a knife or lancet, early or late? Surgeons generally advise quite early opening. Those who, like myself, have felt the pain of an incision during the height of an inflammation, in a tender part, as the hand, will incline towards mercy, and will want to wait till *pointing* occurs. Then the skin at the soft yellow spot loses its sensibility, and can be cut with little or no pain. This may be much lessened, however, by freezing the part with ice before it is cut. The incision ought to be large enough to *let the matter out* freely and fully, so as not to delay its emptying itself and then healing up.

Bowel, Protrusion of. This is called by physicians **Prolapsus Ani.** It occurs most frequently in children, from *straining at stool.* The forced-out portion of the bowel may commonly be returned without much difficulty by gentle but steadily-continued pressure with well-oiled or larded hands. If not, a physician must be called in at once. To prevent the recurrence of such a protrusion, the child's bowels should not be allowed to become constipated (see Care of the **Excretions**, under **Hygiene**); and it should be made to sit, when having a movement, on a rather high seat, the body not being much bent at the time.

Bowels, Inflammation of. *Enteritis* of medical books. Blows or other injuries may cause it; or neglected constipation; or, sometimes,

exposure to cold and wet; also, strangulated hernia (see **Rupture**), obstruction of the bowels, or corrosive poisoning.

Symptoms of enteric inflammation are, pain in a part of the abdomen, increased by pressure or motion; constipation, fever, vomiting, abdominal swelling; later, passage of mucus, blood, or pus from the bowels. There is always danger to life in a decided attack of such a kind. *Typhlitis* is the name given by physicians to a circumscribed inflammation of the beginning of the large intestine (*caput coli*), on the right side.

Treatment of Inflammation of the Bowels requires *absolute rest in bed* from first to last. *Leeching* over the part affected is, I believe, an important early remedy; after that, large, soft, but not heavy, flaxseed poultices, kept moist by an oiled-silk covering. The food taken must be soft and soothing, as arrowroot, tapioca, sago, rice-water. If thirst exists, ice may be swallowed slowly and often. Physicians often advise small doses of opium every few hours, to relieve pain and quiet the bowels. Purgative medicines must be avoided. If the lower bowel is full, an injection of olive oil with soap and warm water may be used to empty it; or one of a tablespoonful each of limewater and oil.

Typhlitis sometimes ends in an abscess, which may require surgical skill to open it and let out the matter. Such cases are critical, and call for the best professional judgment.

Brain Exhaustion. Under **Mental Hygiene**, enough has been said on this subject for the purposes of this work. It may just be repeated, that most instances of Exhaustion of the Brain result from *insufficiency of sleep* rather than from the actual amount of mental labor; that *worry* is more exhausting, always, than work; that *monotony* of labor is very much more wearing than that which is varied in character, and that the one indispensable *remedy* for Brain Exhaustion is *complete* and *prolonged brain rest.*

Brain, Inflammation of. Since the *membranes*, or "*meninges*," which envelop the brain, are almost always chiefly affected with inflammation, this affection is generally called *meningitis* in medical books.

There are two forms of acute Inflammation of the Brain: *simple*, and *scrofulous* or *tuberculous.* The difference in the *symptoms* is, that the *latter* comes on more *slowly*, after signs of a *scrofulous constitution* in the patient, who, nearly always, is a *child;* that the whole course of the disorder is somewhat slower, and that it is *scarcely ever recovered from.* With these distinctions in view, our general description will answer for both varieties.

Most cases of *simple* as well as of *scrofulous* meningitis occur in children, but the number of instances of the former in adults is much

greater than of the latter. *Causes* of the former are: blows on the head, exposure to the sun, great or long-continued mental excitement, erysipelas of the head, scarlet fever, extension of inflammation from the ear to the brain.

First, as signs, we observe complaint of severe headache and irritability, with heat of head, flushed face, constipated bowels, and sick stomach, even vomiting. There is extreme sensitiveness to light, so that the room can hardly be made dark enough. Sounds, also, if loud or sudden, disturb the patient, who sleeps badly, talking or *screaming* when partially asleep. The pulse is full, strong, and rapid; the condition is one of fever.

A *second stage* usually follows in a bad case, in which, instead of irritability and delirium, there is *stupor;* the patient being unconscious, not able to be roused, with a *slow*, full, more or less irregular pulse. This is the time when (as ascertained after death) *effusion* of water (serum) within the membranes of the brain takes place.

The *third stage* occurs only in the worst cases, from which very few are restored. Now the patient continues unconscious, but has also *convulsions*, followed by *paralysis* of one or more of the limbs; a rapid and feeble but not irregular pulse; the contents of the bowels and bladder being involuntarily discharged. In a case of simple meningitis going through all these stages (which, however, pass *gradually* into each other), death results at the end of from eight or nine days to two weeks. *Scrofulous* meningitis lasts more frequently three weeks or perhaps more.

But from *simple* meningitis recovery often happens. I have seen several such cures, even when the symptoms were very severe. In one case, that of a girl ten years old, a violent convulsion occurred, without paralysis following it, just before she began to improve and get well.

For the *treatment* of Inflammation of the Brain, a physician must be called in. Will he allow me to say to our readers what I hope he will advise or do? Should he differ from the present author, of course the book will be closed and put away for the time, as it is impossible to "serve two masters" in the care of one who is ill. But my hope is based on considerable experience in this disease, with a good degree of success.

What I would do is this: have the patient put to bed in the quietest room in the house, and give orders for all in the house to avoid noises of every kind. Let the light be shut out of the room, except just enough to see the way around in it. Have the hair cut very short all over the head; better yet, have the whole head *shaved*. This will not only promote the cure, but, as the hair is apt to come out after such an

illness, it will be better for the hair itself. I would feel the pulse, and if the patient is not old (and old people seldom suffer from *acute* inflammation of the brain), and has been pretty strong in health before, I would, in a severe case, *take a few ounces of blood from a vein in the arm.* Or, if obliged to risk the patient's life by omitting this in deference to somebody's fears (and many, even among physicians, nowadays have such fears), I would at least take blood from the back of the neck by *leeches* or *cut-cups;* leeches, if they can be had, if not, cut-cups. I would also have the head kept wet, day and night, with cold water; iced, if it be summer-time. For this, the handkerchief or other light cloth must be wet *every few minutes*, or it will become and remain warm, and do no good. I would give the patient, very early in the case, an active dose of a *saline cathartic;* Epsom Salts, Rochelle Salts, or Citrate of Magnesium; the first for the strongest patients, the others being suitable for weaker subjects. I would have the diet *liquid* altogether, unless a little milk-toast or ice-cream once in a while; at first, gruel, toast-water, milk; as time went on, after the first week, milk alternated with beef-tea, or other broths; gradually returning to solid foods as convalescence proceeds. If, in spite of all this treatment, my patient went on into the stupor of the second stage, I would apply *dry* (not then cut) cups to the region between the shoulders, and a large *blister*, left on long enough to draw, over the back and top of the head, *just above* where the head touches the pillow when lying down. I would also repeat *moderate doses* of purgative medicine, once or twice, in this stage. If the third stage comes, with convulsions followed by paralysis, rapid, weak pulse and cooling skin, the patient being unconscious all the time, I would simply have all done to keep him sufficiently warm and clean, and prepare the minds of the family for the approaching fatal end.

In a case where the history of the patient and the slow progress of the symptoms indicate *tubercular* meningitis, I would follow the same plan of treatment except the bleeding from the arm, and giving smaller doses of salts or other cathartic medicine, with an earlier recourse to beef-tea as a supporting diet.

Brain, Softening of. The signs of this affection are so obscure, and the difficulty of distinguishing different *forms* of *chronic* disease of the Brain is so considerable, that it will be safest to refer to extended medical books for all that ought to be said on this subject. Softening is one form of *degeneration*, often following chronic inflammation; *sclerosis* or hardening is another form of degenerative change; both the causes and the symptoms of the two are exceedingly alike—the essential element in both being the *morbid alteration of tissue*, with consequent loss of power to perform the healthy functions of the organ affected.

Break-bone Fever. Also called *Dengue.* This has been oftenest seen and best known in the Southern United States, though occasionally met with in the North, and in the East and West Indies and in Egypt. It is not a dangerous disease, but is attended by severe pains in the head, back, and joints. There is generally at first a chill, and then fever, lasting from two to five or six days. A slight rash is commonly seen towards the close of the fever. On this passing off, the patient is left very weak for a time. *Treatment* of Dengue requires rest in bed, moderate saline purgative medicine at the start, liquid diet, and *good nursing;* nothing else.

Bright's Disease. So named after Dr. Bright, of England, who first gave a clear account of it, some fifty years ago. It has been very elaborately studied since, by many physicians. For our present purpose it is enough to say that it is a slow chronic disease of the kidneys (*acute* Bright's disease is also sometimes rather inaccurately spoken of), whose most notable sign is *albuminuria;* that is, the presence of albumen in the urine. It may be caused, especially in a person whose strength has been in any way reduced, by exposure to cold and wet, or by the use of alcoholic liquors; even in what is called "moderate" drinking. It tends gradually towards death, a cure being not reasonably expected. Symptoms are, paleness or puffiness of the face, weakness, dryness of skin, general dropsy, headache, sick stomach, diarrhœa, frequent urination, especially at night; often bronchitis and enlargement of the heart; last of all, *uræmic* stupor, convulsions, and death. The *treatment* is chiefly *palliative* and *economical* of strength; to *prolong life,* which may often be done, with care, for months, sometimes for years.

Bronchial Dilatation. A (not at all common) stretching and enlargement of the branches of the bronchial air-tubes, on their way towards and in connection with the air-cells of the lungs. Very troublesome cough, with thick and abundant expectoration, is the only marked symptom of it; the certain proof of its existence needing *percussion* and *auscultation,* by a practitioner skilled in those methods of examination. *Palliation of the cough* is the only reasonable measure of treatment for it. (See **Physical Diagnosis,** pages 512 and 513.)

Bronchitis. Inflammation of the bronchial tubes. It may be *acute* or *chronic.*

Acute Bronchitis is, simply, a "severe cold on the chest," in which there is neither pleurisy nor pneumonia present. There is weakness, fever, soreness on taking a deep breath, and a cough. The cough is at first dry, hard, and more or less painful; then soft and loose, with white mucous phlegm; last, in severe cases, with yellow or greenish purulent expectoration. It is seldom fatal, except when, as **Capillary** Bronchitis,

it affects the multitudinous *smaller* (capillary, small as hairs) branches of the air-tubes, as they enter the lungs. This interferes so much with breathing that it is quite often a mortal disease.

In *treatment* of Acute Bronchitis, a good dose of *saline purgative* medicine should be given early; Epsom salts, Rochelle salts, or citrate of magnesium, according to the strength of the patient. Early, also, we must begin with something to *soften* and *loosen* the cough; that is, to promote *relaxation* and *secretion*. As a Home medicine for this, *syrup* of *ipecac.* is the best stand-by; from a quarter to half a teaspoonful every three or four hours. A quarter teaspoonful will be enough generally through the day; the last dose at bedtime being a half teaspoonful. Flaxseed-tea, made *without boiling*, and flavored with lemon juice and sugar, will be a useful drink, taken a little and often. A mustard-plaster may be applied for half an hour or so to the upper front part of the chest; and after the soreness from that application has entirely gone, the same part may be bathed, night and morning, with *volatile* liniment, *i. e.*, equal parts of hartshorn (aqua ammoniæ, or spiritus ammoniæ aromaticus) and sweet-oil (olive- or lard-oil).

After the first day, *syrup of wild cherry bark*, a teaspoonful each time, may be given with the ipecac. As soon as the cough decidedly begins to *soften* and *loosen*, lessen the dose and frequency of use of the ipecac.; continuing the wild cherry. When it amounts to considerable expectoration, the soreness of the chest giving way, *leave off* the ipecac. and give instead *syrup of squills*, in half teaspoonful, or (with persons of strong stomach) teaspoonful doses, three or four times daily; still with teaspoonful doses of wild cherry syrup.

Leaving the management of *bad* cases of Acute Bronchitis, and especially *Capillary* Bronchitis (known, even without skilled examination by auscultation and percussion, by the *great oppression in breathing*, and *weakness of the patient*) to the care of the physician, it will be almost always easy as well as expedient to have his or her advice also in cases of *Chronic* Bronchitis. We have already, however, under **Remedies**, remarked upon the medication of *cough*, at different stages. When once fairly loosened, and yet troublesome, especially at night, it needs *quieting*. For this we have the mild and innocent *soothing* action of *candies* (hoarhound the favorite), *liquorice*, *marsh-mallow*, *gum-arabic*, and *eucalyptus*. Also, to syrup of squills and syrup of wild cherry may, with a loose cough, be added at night a quarter, half, or whole teaspoonful (according to the urgency of the case) of *paregoric*, or *syrup of lactucarium*. *Chloride of Ammonium*, in ten-grain doses three or four times a day, is a good expectorant in such cases. Or *Wistar's Lozenges*, which, when regularly made, contain a little opium, may be

at night, slowly dissolved in the mouth and swallowed; from one to four, as needed, in a night.

Weak states of the system, lastly, may require *stimulating* expectorant medicine. *Carbonate of Ammonium* is the best representative of this class; dose, from two to five grains every two hours, dissolved in some expectorant syrup (as wild cherry, for example).

On recovering from either Acute or chronic Bronchitis, *protection* of the chest from cold is of much importance. A *warming-plaster* (as Allcock's porous-plaster, or simple Burgundy pitch-plaster) is excellent for this purpose. Indeed, such a plaster ought to be put on early in the case, and kept on for several weeks. Also, *flannel next the skin*, and, in cold weather, an *extra piece* of flannel, or a *rabbit skin* over the breast, will render good service in preventing renewal of the cough on going out in American weather (the most extreme and changeable in the world).

Bunion. This is an enlargement of one of the larger joints of the toes, commonest on the outside of the great toe (*inner* side in relation to its nearness to the other foot). The skin inflames and thickens, under the pressure of an ill-fitting shoe; the joint itself becomes then more or less involved in the inflammation. It may be very sore and painful in walking. It will be quickest cured by remaining in bed or on a couch until all the pain, heat, and tenderness have subsided, under the application of a bread or flaxseed-meal poultice. Then treat it like a large corn. (See **Corns.**) Wear a slipper in the house, and a *loose* shoe (with a piece cut out over the bunion, if necessary) out of doors. Pare off all the thick, hard outside skin, and put over the *base* of the bunion *two* circles of adhesive plaster (round pieces with the centres cut away) and on the summit *one* small round piece. This will shield the tender part from friction and pressure.

Burns. See **Accidents** and **Injuries**, in the last part of this book.

Bursa, Enlarged. A bursa is a sac, filled with watery fluid, made by a collection of serum in part of the sheath of a tendon. Such enlargements are most common on the back of the hand, near the wrist. An inflammation, produced by a blow or sprain, causes *adhesion* of the fibrous sheath around or above the tendon, and thus the fluid, increased in quantity also by the inflammation, makes a round, firm swelling. It may become as large as a hickory-nut, or larger, but more in shape like a lima bean. There is no danger or great inconvenience in such swellings; they are merely clumsy and unsightly. A sudden sharp blow with a middle-sized book will often break up the adhesion, and make the swelling disappear. If this fails after a trial or two, it will not be best to reiterate it, as the inflammation produced by much violence may cause it to grow larger. A surgeon may safely puncture the bursa with a hypodermic injecting tube, or with the needle of an *aspirator*.

Cachexia. An unhealthy state of the system; a morbid habit of body, or faulty constitution. See the **Nature of Disease,** at the early portion of **Domestic Medicine.**

Calculus. See **Stone** in the **Bladder.**

Camp Fever. See **Typhus Fever.**

Cancer. A *malignant tumor* of any part of the body; that is to say, a swelling which grows slowly, is very painful, often becomes an open sore, and at last wears out the strength of the patient; causing death within a year or two from its beginning. It most frequently attacks the womb, female breast, stomach, or lower bowel; and is not often met with before middle life. There are three principal varieties of Cancer: *hard* (scirrhous), *jelly-like* (colloid), and *soft* (brain-like, encephaloid) Cancer. Best known to unprofessional persons is Cancer of the *breast.* It begins in a small hardening of a part of the mammary gland, which gradually and irregularly enlarges, and becomes the seat of severe pains. After several months, it turns to a large, open, discharging sore; with more and more pain, weakness, and distress. The lymphatic glands near it also enlarge; the whole system becomes enfeebled and "cachectic." The face is pale, the body wastes, and at last death ends the history of the disease.

Cancer of the *stomach* is met with at the *pylorus;* that is, the *right* end, where the stomach opens into the small intestine. It so obstructs and interferes with digestion as to *starve* the sufferer in about a year. Cancer of the *womb* may continue for two years before death.

There is *no cure* for Cancer. If discovered and cut away, very *thoroughly, not long after its beginning* (which can sometimes be done with Cancer of the breast), it may not always return. When an *advanced* Cancer is removed by an operation, either it starts again at the same place, or, within a few months, invades some internal organ; as the liver, lungs, brain, etc.

Were I to be affected with Cancer, I should have tried upon myself a treatment which has never, so far as I know, been tried, or even proposed, before; namely, introducing (if the part be within reach, of course) *pure alcohol* repeatedly, and in several places, by means of a hypodermic syringe, into the substance of the tumor. I think it would probably act somewhat as it does with dead animal tissues; shrink it up, alter its texture, and arrest its growth.

The management of a case of Cancer, apart from the question of an operation, consists merely in taking care of the *general health* of the patient, and, in time, using measures for the relief of *pain.* Opium, or morphia, is the main dependence for this. It is important, for the patient's advantage, not to increase the dose of the opiate too fast. Let

no more be used, of laudanum, for example, than is necessary, at first only at night, to keep the suffering abated enough for a fair amount of good sleep. If given too largely, not only will the effects at the time be disturbing to the stomach, to the bowels (by constipation), and to the whole nervous system, but the anodyne influence will be *wasted;* the susceptibility of relief from it being lessened more and more.

Canker-mouth. An ulcerative sore mouth, on the lips, gums, and also extending to the cheeks; sometimes reaching the throat. It is most common in children, from two to six years of age. It is quite painful. The child slobbers, and the odor of the breath is offensive. Touching the ulcers lightly with nitrate of silver or bluestone twice daily, and covering them often between times with a powder of prepared chalk and gum-arabic, equal parts, will be a safe treatment in the absence of a physician; the *general condition* of the child being dealt with on common general principles. That is, if the child is thin and weak, give it cod-liver oil, iron, and beef-tea, as well as milk. If it is costive, open its bowels gently and regularly with mild medicines; if it has diarrhœa, use lime-water, and, if need be, stronger means (see **Remedies**) to keep it in check. See page 529.

Carbuncle. (*Anthrax* of medical books; though this term is also applied to a malignant and fatal disease of sheep.) The biggest and worst kind of furuncle or boil. Sometimes it is as broad as the top of a teacup or a small saucer. With an intense and most painful inflammation, the central part dies (sloughs), and there is no relief until it is somehow discharged. It is possible for death to follow a Carbuncle, especially if it invade the neck or chest. Surgeons generally take charge of the treatment of Carbuncles, and mostly think it best to cut them open early and freely. Less painful is it to *freeze* the part with pounded ice, which benumbs the feeling, and then burn away the surface with *caustic potassa.* One eminent English surgeon, Paget, does not open Carbuncles, but feeds the patient well with beef-tea and milk, gives him quinine, and nurses him through; trusting to nature to open out and relieve the inflammation and sloughing in good time. I am not able or willing to decide between this high authority and the majority of other practitioners. It will be best to be governed by the judgment of the surgeon or physician called upon in each actual case.

Cardialgia. Heartburn. Really *stomach*-burn; a symptom of *dyspepsia.* The feeling seems to be, but is not, in or near the heart.

Caries. Decay of a bone, resulting from inflammation. *Necrosis* is the *death* of a part or the whole of a bone, whether preceded by inflammation or not.

Caries of the Spine, See **Spinal Caries.**

Catalepsy. A rare nervous disease, in which the person has attacks, in which he remains for a short time with all the muscles rigidly fixed in one position. (See extended Medical works.)

Catarrh. Physicians mean by this a disorder of any mucous membrane, as the nostrils, bronchial tubes, etc., in which acute inflammation is accompanied or followed by a flow of phlegm (mucous discharge). Since such a disorder is most often met with in the breathing passages, in common language a Catarrh is a cold on the chest; or one affecting the nose and chest together. (See **Bronchitis.**)

Cephalalgia. Headache; which see.

Cerebro-Spinal Fever. Often called *Cerebro-spinal Meningitis;* also, *Spotted Fever.* One of the less common varieties of fever, but

FIG. 212.

CEREBRO-SPINAL FEVER. (J. LEWIS SMITH.)

very fatal; more than half of those attacked with it die. Children are oftener its subjects than adults. Armies, and garrisons of forts, etc., have been the centres of its epidemic prevalence in a number of instances.

It begins suddenly, with chilliness, terrible pain in the head, extending to the back of the neck, nausea, and vomiting. Delirium follows, ending not infrequently in stupor. Tetanic spasm, or rigidity of the muscles of the back of the neck (and sometimes of the back and limbs), is common. Convulsions are much less so, but do occur, particularly in the young. Painful sensitiveness of the surface of the body is present in most cases, when there is not stupor. Loss of sight and hearing may take place during the middle period of the attack. The pulse is at first slow, then rapid and weak. The bowels are costive or about as in health. The skin is at first rather cool; later, it is often hot; dry, usually, unless towards the last. A certain number, not nearly all, of the cases have *spots*—red, purple, or black—all over the body, from three-quarters of

an inch down to a pin's head in size, not disappearing on pressure. These have given the popular name of Spotted Fever to the disease. An attack mostly ends either in death or with the beginning of recovery within three days.

How do we know this disorder by sight? Its diagnosis is often more difficult than that of almost any other fever. Peculiar, however, are its *suddenness;* the *stiffness* of the *muscles;* and, when they occur, the *spots. Malignant scarlet fever* sometimes resembles it; and so may the *chill of pernicious intermittent fever;* but each of these has differences of history which, with care, may suffice for distinction.

Experience amongst physicians with this disease has not led to so satisfactory an agreement upon its *treatment* as would be desirable. *Home* management, therefore, must include but a few simple measures. Let the patient's hair be cut very short. Apply cold (iced) water to the head frequently, *if it be hot;* not otherwise. Put the patient, if a child, or an adult not too heavy to be lifted, into a warm bath, almost hot, say at 98° Fahrenheit, and keep him there for twenty minutes. After drying (with great care to prevent his being chilled), apply a long and wide mustard-plaster (half and half mustard and wheat or Indian flour) from the back of the neck down the back; leave it on until, upon looking under it every few minutes, the skin is seen to be *decidedly reddened* by it. Besides this, *dry cups* may be applied to the back of the neck and between the shoulders, and left on ten or fifteen minutes at a time. If any medicine is given, let it be a moderate dose of a saline cathartic—Rochelle salt, Tarrant's aperient, or citrate of magnesium. While food can be swallowed, let it be beef-tea or milk only. All other treatment had better be omitted in the absence of a physician; and happy is the practitioner who contends successfully with this mysterious and dangerous, but happily not common, malady.

Chicken-Pox. Called *varicella* in medical books. This term is a diminutive of *variola*, small-pox; and the disease resembles the latter, or rather *varioloid* (modified small-pox, after vaccination), a good deal. It is contagious from person to person, but is the mildest and least dangerous of all contagious or infectious diseases, not even excepting mumps. It commonly affects the same person but once in a lifetime.

Four or five days after exposure to the contagion, *pimples* form, *scattered* over the face, limbs, and body. On the next day, they become watery vesicles; two or three days later, they scab, and shortly after fall off. They seldom fill with yellow matter, and almost never *pit* like small-pox. Little or no fever, generally, is present, though I have seen two or three children quite sick with it. The eruption often comes out in two or three successive crops or sets of pimples. Like other

such diseases, children are much more frequently attacked by it than adults.

Chicken-pox needs, in *treatment*, only careful *nursing;* keeping the bowels open, with simple and soft food, the patient remaining in one room to avoid risk of taking cold. If fever should come on, solution of citrate of potassium (see **Remedies**) or acetate of ammonium may be given while it lasts. Care *on first going out* is important after any such disorder, as the system is then always especially susceptible of depression from cold and dampness. See page 541.

Chigoe. This (also called *jigger*) is the *penetrating flea* of South America, whose bite is a much sorer affair than other common flea-bites.

Chilblain. See **Frost-bite.**

Child-bed Fever. See **Puerperal Fever.** **Chills.** See **Ague.**

Chloasma. An affection of the skin, in which dull reddish-yellow spots of various sizes and shapes appear on the chest or abdomen. It is curable by *parasiticide* applications, being dependent on the presence of a minute (microscopically small) fungoid vegetation. Tar ointment, mercurial ointment, and solution of corrosive sublimate, are examples of agents usable to destroy such parasites and cure the skin diseases caused by them. (See **Remedies**, pages 551 and 802.)

Chlorosis. "Green Sickness." A disorder of girls, between fourteen and eighteen years of age, usually. The complexion is yellowish or greenish in hue; the lips are pale, the body is weak and nervous; often there is palpitation of the heart. A curious symptom present in many cases is a *morbid appetite* for ashes, slate-pencils, chalk, or other out-of-the-way things. Disturbance of the menstrual function, especially its suppression (amenorrhœa), is apt to be present. No danger to life attends it, but it may last for months or years.

Treatment of Chlorosis must aim to *build up* constitutional vigor. Good, but not stimulating, diet, change of air, sea-bathing, and light gymnastics (calisthenics) will be important. *Iron* is the medicine most depended upon. A few patients do not bear iron well, on account of fulness of the head, increased by it. Such can generally take it, at least in rather small doses, after being moderately purged with some saline cathartic. See page 616 for doses.

Choked Disk. An expression used by oculists when, on examining the eye with an ophthalmoscope, they find the part where the end of the optic nerve-trunk enters the eyeball *congested;* that is, swollen with an excess of blood.

Cholera-Morbus. Vomiting and purging together, coming on as an attack of disease, not caused by a poison. It may be produced by indigestible food at any season; but is much most frequently met with

in warm weather. Being *chilled after* getting very warm is especially promotive of it. Sometimes it occurs without any known error of diet.

Put the patient to bed. Apply a large mustard-plaster (half and half with wheat or Indian flour) over the pit of the stomach. If *very ill* with it, make him use a bed-pan instead of rising to have the bowels moved; in any case, do not allow him to walk out of the room. Have *ice* at hand, and give him a small lump of it every few minutes to melt in the mouth and swallow slowly. While waiting for the doctor, or if none can be obtained, it will be quite safe to give the following simple, but very efficacious medicine:

Put a Teaspoonful of best calcined Magnesia, and a Teaspoonful of Aromatic Spirit of Ammonia, in four Fluidounces (about a Teacupful) of Peppermint Water. If that is not at hand, pure Water will do, though not so well. Shake the mixture in a corked bottle; and give of it a *teaspoonful every fifteen or twenty minutes* (shaking it always before pouring it out). If this be continued for an hour or two, right along, nine times in ten the patient will be relieved. Bad cases *may* require also an injection of laudanum and starch into the bowels (see **Laudanum,** under **Remedies**); and, perhaps, whisky or port wine in teaspoonful or dessertspoonful doses in arrowroot or rice-water. But not many instances of the need of such stimulants occur; they had better be avoided unless *great exhaustion* (not mere sickness of stomach and distress) is present. At the *beginning* of an attack of Cholera-Morbus, alcoholic drinks of any kind will be likely to do *harm* rather than good.

Cholera. An epidemic disease, whose original home is India; there it prevails, more or less, every year. Since 1832, it has visited Europe, Africa, and America several times; travelling in a way of its own, as "on the wings of the wind." It visits *towns*, *villages*, and *ships*, almost exclusively; remaining seldom more than a month (often less) at one place. Of those attacked with all its symptoms, about one-half die. Very many cases of watery diarrhœa, "cholerine," occur before, during, and after its visitations. Filthy towns, and the nastiest places in towns or villages, as well as the steerages of ships, may be affected, while the clean and airy portions of the same are free from it; unless among those whose *water-supply* is bad. It is *not contagious from person to person.* I assert this without hesitation. It is generally so understood in India; yet many medical writers (elsewhere) cling to the altogether unproven notion, that it is only conveyed by the passages from the bowels of those sick with it. As if that could account for outbreaks of it, of which there have been many, on ships *two weeks out at sea;* even when there had not been, for years, a single case at the *ports* those vessels had *left!* (On this, see previous remarks under **Causation of Disease,** page 481.)

Symptoms of Cholera resemble, in a general way, those of cholera-morbus. But, while in both there are vomiting and purging, in cholera-morbus the matters thrown up and passed from the bowels have a *yellowish or greenish-brown color;* in Cholera, all that comes, either from stomach or bowels, is *colorless* and *watery;* often having tiny flakes in it, and therefore called **rice-water** discharges. Also, the weakness is much greater in Cholera from the first; rapidly deepening into the **collapse.** This is a condition of *coldness* and *prostration*, with *thirst, shrinking* and *blueness* of the *skin, loss of voice, difficulty of breathing, cramps* in the limbs, *absence of pulse, suppression* of *urine*, and large and frequent vomiting and purging of rice-water discharges. The *worst* cases may fall and die in ten minutes. Most of them end in death, or in the beginning of recovery, within twelve hours. Sometimes a low sort of fever lasts for two or three days.

Important to be attended to is the *premonitory diarrhœa.* In much the larger number of instances, a watery looseness of the bowels, without pain,* precedes the regular attack for several hours. Any one so affected, in cholera time, ought to *lie down* at once, remain quiet, and take some warming medicine for diarrhœa.

Treatment of Cholera has varied much, amongst physicians. Referring to medical works (e. g., *Essentials of Practical Medicine*) for particulars, I will here mention only the method which I learned in 1849 from the late Professor W. E. Horner, of Philadelphia; by which I am sure many lives have been saved.

First, the *premonitory diarrhœa* requires, besides rest in bed, nothing stronger than *essence of ginger* and *paregoric;* ten or fifteen drops of the former, with half a teaspoonful of the latter, every two hours until relieved. *Aromatic sulphuric acid* (elixir of vitriol) succeeded so well in some of the later epidemics, that if Cholera comes again here I should confide much in its use for the premonitory diarrhœa; fifteen drops of it, in a small wineglassful of water, every two or three hours. It may be *alternated* with paregoric and ginger.

If a case already *approaches collapse*, then give the following, which I have called "*chloroform paregoric*":

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* My knowledge of this last fact stood me in good stead in 1854; when, on my way to render aid, with others, as a volunteer physician during the terrible epidemic at Columbia, Pa., I suffered with a *painful* diarrhœa all the night before reaching that place. Nevertheless, I went on; and was able to remain several days there on duty without being attacked by the disease.

Take of Chloroform,
Laudanum,
Spirits of Camphor, and
Aromatic Spirit of Ammonia,
each a fluidrachm and a half;
Oil of Cinnamon, eight drops;
Creasote, three drops; *
Brandy, two fluidrachms. Mix, and keep in a glass-stoppered vial.

Dissolve a teaspoonful of this in a wineglassful of cold water, and give of that two teaspoonfuls *every five minutes;* following each dose with a small piece of ice placed in the patient's mouth. Small and frequent drinks of ice-water may be allowed, if wanted, as they are pretty sure to be. Intense thirst is almost always present as a symptom. Also, mix together whisky and red pepper (exact proportions are here not of consequence; only it must *run* as a thick liquid), and *rub* the arms and legs constantly with them. Put bags of *hot salt*, or tins of *hot water*, to the back and belly, or on each side of the body, in the bed. Give a tablespoonful (not more) of whisky every hour or two, in about twice as much ice-water; this, too, being followed by a lump of ice. If, on this method of treatment, you do not save your patient, I do not believe there is any chance for him otherwise. Yet, as I have before said in regard to other diseases, when your doctor arrives, close the book and trust to him. I *hope* he may approve the above practice; which is, in principle, very much like what Dr. Aitken, in his valuable Treatise on the Practice of Medicine, mentions as being used with success in India and England.†

When *collapse* has fully set in, if that *should* happen *in spite* of such measures as the above—all treatment remains to be desperate experimentation, with but little ground for hope. Consideration of such a subject belongs to more extended medical works.

One popular error about Cholera needs to be corrected; namely, that a particular kind of *diet* will prevent any one from being liable to it. Quite as many (probably more) persons are attacked, during an epidemic, who live on rice, arrowroot, crackers, etc., as of those who take ordinary food; including meat, good sound vegetables, and fresh fruit. Of course it is necessary to be especially careful as to the *quality* and *condition* of food at such times. Cucumbers among vegetables, and cherries

* This was not in Prof. Horner's prescription; and I am not sure of its importance in the treatment.

† See "Essentials of Practice of Medicine," p. 495, *foot-note.*

and pineapples among fruits, may be omitted; hardly anything else need be, if *fresh* and *ripe*. *Alcoholic intemperance* (even in moderate degree) greatly increases the danger of death from cholera; and so do excessive indulgences, or even great fatigues of any sort. The great principle of safety during all epidemics is, to keep the bodily condition *at par;* neither above nor below its ordinary state and activity.

Cholera Infantum; *Summer complaint.* Medical writers are not all of the same opinion about the precise use of the term *Cholera Infantum.* For our purpose, however, we need not discuss the name of the disease; let us simply consider what it is, and how best to manage it, when left to our own resources. *Large cities,* and the *hottest summer weather,* give physicians abundant experience with it. No child under five years of age, whose parents can afford to take or send it to the country, should remain in New York, Philadelphia, Baltimore, Cincinnati, or St. Louis, etc., during July and August. Infants one or two years old are far the most frequent subjects of summer complaint.

Its *symptoms* are, *diarrhœa, vomiting, rejection of food, languor, weakness;* sometimes stupor. Occasionally the child may waste away and die in a few days; oftener, it lasts from one to two or three weeks. Sometimes the diarrhœa will linger on, after the vomiting is checked, for a still longer time.

Treatment requires three things chiefly: *correction* of the morbid state of the digestive organs; *checking* the *vomiting* and *diarrhœa;* and *supporting* and *restoring* the strength of the little sufferer.

Corrective medicines should come first. Such are, *lime-water; soda* (bicarbonate of sodium); *calomel; mercury with chalk* (hydrargyrum cum creta); and *spiced syrup of rhubarb.* In *home* practice, lime-water may be given with milk at the start; a teaspoonful of each, several times, at intervals of an hour or two. Should vomiting and purging continue, then get *calomel* powders, *one-twelfth of a grain* in each; put one of these, rubbed up with a *pinch* of *soda* (about two grains, but exactness in this is not important), on the child's tongue, every three hours. Also, mix a *spice-plaster* (a teaspoonful each of powdered ginger, cloves, and cinnamon, made into a thick paste with whisky or brandy) large enough to cover the whole belly, and lay it on, covering it with a piece of oiled silk or thin rubber cloth. When the spice-plaster becomes dry, take it off for a moment, wet it with whisky again, and replace it. So used, one plaster will last a whole day and night. *Ice,* pounded in a clean linen rag into small bits, may be put to the babe's mouth often, for it to suck. Small drinks of iced thin rice-water may also, if seeming to be craved, be given now and then. For nourishment, *milk,* or, if diarrhœa is very bad, *arrowroot made with milk* (see **Food** for the

Sick, p. 636 in this book), should be given, in *small amounts*, every two or three hours. When the skin is cold and the child takes little and is very weak, ten drops of the *best* whisky or brandy may be added to the food about once in three hours. Notwithstanding a different view held by a few medical authors, I regard it as an *unsafe practice* to give teaspoonful doses of whisky or brandy to young infants, under any circumstances.

Calomel powders and soda belong to the *first two or three days* of an attack of Cholera Infantum. After that, if the symptoms continue severely, especially with much diarrhœa, *astringents* are wanted, to check it. *Blackberry-root tea*, in dessertspoonful doses every three hours, with five drops of paregoric each time, will do well. So will *geranium* (wild geranium, of our woods) *root* tea, also; or *logwood* tea; or ten-drop doses of the *tincture of catechu*, with paregoric. If the diarrhœa proves obstinate and exhausting, an injection (one or two teaspoonfuls at a time, with a *small* syringe) of *starch*, with one or two drops of laudanum, will be suitable.

Late in the attack, when prolonged, strong and varied diet being needful to support strength, *beef-tea* (*iced* or *frozen* will be best in this complaint), *chicken-water*, and *mutton-broth* may be given, turn about with perfectly good and fresh milk. The milk, by the way, should be *scalded* (brought to the boil) just before being used. *Boiled flour* food (mentioned under **Food** for the **Sick**) and Meigs' *gelatin* food, may have their place also, as alternatives. When slowly convalescent, to suck a piece of *lean ham*, or good *dried-beef*, may be relishing; and so may be the expressed *juice of lean raw beef*.

Now, in all this, we should have been beginning at the wrong end of the matter, but for the statement already made, that *no child under five years of age* should, if avoidable, remain in any of our large cities, during July and August. If, while remaining in town, summer complaint comes on, *take it away to the country at once.* Any high, open, real country place, where it can get good milk (if it has not its mother's in abundance, or has been weaned in its second year), will do. So will the sea-shore, if *good fresh milk* and *good drinking water* can certainly be had. Prompt removal to the country will often cure with very little medicine; the best medical treatment may fail while the child remains in town.

Chorea: *St. Vitus's Dance.* A nervous affection, nearly always of young persons; characterized by irregular *jerking movements*, which continue more or less all the time except when the patient is asleep. Generally it lasts several weeks; sometimes months; in rare cases, years. It occurs mostly in rather thin, pale, and weakly boys or girls. Some-

times it is brought on by *fright*. The organs of speech are affected in a few cases, as well as the limbs. For its *treatment*, time will always be afforded for medical advice. It may be here simply said, that building up the system is usually required; *iron, cod-liver oil, salt baths, rubbing* and *light gymnastics* are among the remedial measures likely to be appropriate for it.

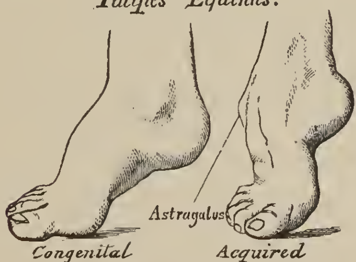
Chronic Disease. This is, simply, *continued*, protracted, as distinguished from *acute* disease. Acute attacks, such as measles, the different fevers, and severe inflammations (as bronchitis, pneumonia, etc.), have a time of days, or, as in typhus and typhoid fevers, of weeks (whooping-cough, months, often), in which they run their course.

FIG. 213.

Congenital Varus.

FIG. 214.

Talipes Equinus.



CLUB-FOOT.

Chronic disorders, as consumption, Bright's disease, diabetes, etc., have no such limitation. Some of them are, nevertheless, curable in many instances. This is the case with *chronic bronchitis*, chronic *dyspepsia*, and several other affections of indefinite duration.

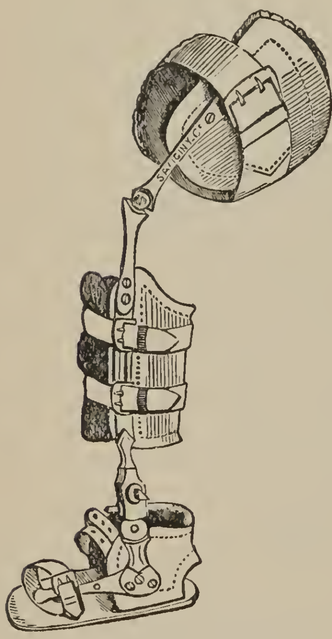
Cirrhosis. A mode of degenerative change in various organs of the body, most familiar to physicians as occurring in the liver. It is one of the most common and serious of the results of intemperance.

From its **cause**, it is sometimes called *gin-liver;* from the appearance of this organ after death, *hobnail-liver*, or *nutmeg-liver*. *Symptoms* of it are, nausea and indigestion, with furred tongue and slight yellowness of the eyes and skin; later, constipation, vomiting,

debility, wasting of the body, dropsy, and enlargement of the veins over the abdomen. Towards the close, bleeding from the bowels (perhaps vomiting of blood), delirium, and stupor, with convulsions in some cases, occur before death. For all this course of events, besides withdrawal of the cause (if it be alcoholic) the physician can only prescribe *palliative*, not, with any hope, curative, treatment.

Club-Foot. A deformity with which some children are born; but which occasionally is acquired, from debility, and want of knowledge and care on the part of parents, during infancy. Only a child whose nervous system is defective almost or quite to paralysis, can suffer this last misfortune, with ordinary attention from its care-takers.

Fig. 215.



SHOE FOR CLUB-FOOT.

There are several varieties of Club-foot. The foot may be *turned in*, so that in standing the child would rest on the outer side of the foot and ankle; or *turned out*, the weight of the body coming on the inner ankle and side of the great toe; or the *toes may be extended*, so that the heel will not reach the ground; or the foot may be *bent up* towards the knee, the heel only, without the sole or toes, touching the ground when the body is erect. (Figs. 213, 214.)

Many cases of Club-foot may be cured by proper treatment; some can only be improved, and rendered less inconvenient. The thing to do, of course, is to get the foot straight and keep it so. Surgeons effect this in certain suitable cases by cutting one or more of the tendons ("leaders") of the muscles which draw too much one way, and then, by means of apparatus made for the purpose, allowing the healing of the divided tendon to take place at greater length. Other cases can be brought right by the long-continued application of apparatus (made to fit each case) which gradually forces the growing limb into its proper shape. If even a cure is not thus effected, the child may often at least be enabled to walk much better than without such assistance. *Orthopædic Hospitals* are established in various places for the special treatment of this and similar deformities.

Colic. There are several kinds of abdominal pain, all often called Colic

1. Common *flatulent* (windy) Colic; 2. *Bilious;* 3. *Spasmodic,* gouty; 4. *Lead* Colic. Also, *passage of gall-stones,* and of *gravel-stones,* causes severe pain in the abdomen; and some women have attacks of pain in one or both of the *ovaries. Neuralgia* and *rheumatism* sometimes affect the bowels painfully. *Obstruction of the bowels* (which see) is attended with severe and obstinate pain, with entire absence of any passage from the lower bowel. *Strangulated hernia* (rupture) likewise causes pain and great distress. In every case of protracted colic, the possibility of one of these mishaps needs to be considered and examined into by a physician.

Flatulent Colic is brought on by indigestible food, in most instances. Cold and wet, however, especially wet feet, predispose to it. The pain is chiefly felt in the colon (arched portion of the large intestine) across the middle of the belly; but it is not nearly always confined to that part of the bowels. The abdomen swells and hardens more or less, but is not tender to the touch, unless after an attack has continued for a number of hours. Pressure often relieves the pain. Sickness of stomach is not uncommon in severe attacks; constipation of the bowels is present as a rule with scarcely any exceptions. A sign of the commencement of relief is *rumbling* of the bowels, showing that the wind moves downwards; the spasmodic rigidity of the muscular coat of the intestine giving way to the natural "peristaltic" movement.

In *treatment* of Colic, we have four things to aim at: to relieve pain and spasm; to open the bowels; to ward off inflammation; and to prevent repeated attacks.

First, in *flatulent* bellyache, apply a *mustard-plaster* all over the abdomen. When it has been on as long as can well be borne without blistering, follow it with something to convey *heat;* a tin or bag of hot water is the most convenient thing for this. Give, as *correctives, soda, essence of ginger,* and *spiced syrup of rhubarb;* a pinch of the first, fifteen drops of the second, and a tablespoonful of the last. Should relief not follow this, or begin at least to come, within half an hour or so, next give a teaspoonful of *magnesia,* with twenty drops of *spirits of camphor,* a teaspoonful or two of *Warner's cordial,* and a tablespoonful of spiced syrup of rhubarb again. Or, a tablespoonful of *castor-oil* well mixed with twice as much of the same spiced syrup. When such (or similar) doses do not seem to make any sufficient impression, the bowels not being moved, give an *enema* (injection into the bowels) of castor-oil, soap, molasses, and warm water. (See **Injections**, on page 579.) If the pain still continues severely, we must begin with some *anodyne. Laudanum* is the quickest for this purpose; fifteen drops, repeated, if need be, in half an hour. After the second dose, an unprofessional person should not venture further, if it is possible to

obtain competent medical advice. Physicians are, sometimes, obliged to administer opiates to relieve extreme pain, in doses too large to be safely taken under ordinary circumstances. A certain amount of relief is often given to Colic by gently *kneading* the bowels with a warm hand, to aid in pushing the wind through from part to part. In my own person, I can always entirely relieve such pain by *pressing firmly* on the *front edges or sides of the hip bones* (acting on nerves passing there). Believing this to be a discovery of my own, not without value, it may often fail with others, from want of patience in its application, or from not applying the pressure in the proper place. I am about having made a pair of compressors, to ascertain how much can be done in this way towards the mitigation of abdominal pains.

One of the simplest, and yet most nearly sure, means of relieving the beginning of flatulent colic, is rubbing the surface of the abdomen and back with a *hair-brush* or *clothes-brush*. It may be used as briskly as can be without hurting; passing the brush from left to right over the lower part of the belly, and then in a circle round from right to left at the upper part, above the navel. This is useful (the brisk brushing) also in fresh pains of other parts; as the muscles, from cold; what is commonly called rheumatism, although it may be just *cold-pains* and nothing more. One who has never tried this simple brush-remedy for commencing pains, may be surprised at the amount of relief it will give. Of course we cannot expect much from it in an advanced case.

The above is an average treatment of a bad case of flatulent or crapulent Colic, which is the commonest kind.

Bilious Colic is slower in progress, with more vomiting, and very obstinate pain. It may last from one to two or three days. The treatment of it, however, is essentially the same, with more patience and perseverance. Some practitioners will begin the treatment with a dose of *calomel* or *blue pill;* perhaps with opium (a fraction of a grain) added to either of those correctives. If a *gall-stone* passes from the gall-bladder to the small intestine, the pain will stop suddenly when it enters the latter. The same is true of *gravel-stones*, when, passing from a kidney, through a ureter, they enter the bladder.

Spasmodic (often gouty) Colic is frequently called *cramp in the stomach.* It is very apt to attack the stomach rather than the bowels. It comes on suddenly, and is very severe and prostrating. For it, the treatment must be *prompt*, *warming*, and *anodyne.* Paregoric or laudanum may be given at once, in spiced syrup of rhubarb. *Oil of cajuput*, six or eight drops on a lump of sugar, is very good for this kind of attack. A mustard-plaster over the stomach, and, if the feet be cold, a hot mustard foot-bath, will be proper.

Babies' Colic must be treated on the same principles as flatulent Colic in the adult. Moving the bowels, causing the wind to move, and relieving the pain; these are the "indications." Sweet- or castor-oil or magnesia (again in spiced syrup of rhubarb) will be right for the first purpose. Essence of Peppermint (a drop at a dose, or, for a child under six months, a drop in two doses, in syrup) and *camphor-water* (not spirit) in teaspoonful doses, or *milk of assafœtida*, a teaspoonful, may represent the *carminative* (wind-moving) medicines for infants. If they, with a hot flannel, wet if need be with *essence of ginger*, do not relieve, put the babe into a warm, almost hot, bath, and give it one drop of laudanum. Seldom will it require more than this.

Lead Colic is attended by shrinking instead of swelling of the abdomen; the bowels are also very costive. Pressure relieves or eases the pain. It is produced by lead-poisoning in some way or other. If exposure to this has just taken place, a moderate dose of *Epsom salts* will act as an antidote to the lead (making an inert sulphate of lead). Later, a *milk diet* will be important. *Sweet-oil* may be repeatedly given to act gently upon the bowels; and suffering may be relieved by opium in some form, in moderate doses, especially at night.

Collapse. The lowest possible state of the system short of death. The skin is cold, blue, or ashy white, shrunken, and damp; the eyes are glassy and half open, or staring without movement; breathing is short, quick, and laborious; the pulse is rapid and thready, hardly to be felt, or absent. Such a condition is seen in *cholera*, in bad *cholera infantum*, the chill of *pernicious fever*, and after extensive burns or scalds, heavy falls, or railroad accidents; whatever shocks the system beyond its power (at the time at least) of reaction. *Stimulation*, with *warmth* and *perfect rest*, is the approved treatment for Collapse. *Ammonia* (aromatic spirit, in half-teaspoonful doses) and *alcohol* (whisky or brandy, in teaspoonful to tablespoonful quantities), at short intervals, even every fifteen or twenty minutes at first, lengthening the time as reaction comes on; these are what we must chiefly rely on. *Direct heat*, by sand-bags, vessels of hot water, etc., may be applied to the body at the same time. As soon as the pulse fills up, the skin grows warm, the breathing free, and the countenance natural, all stimulation must be at once withdrawn. If it be pushed too far, or kept up too long, fever and perhaps inflammation may follow, and interfere with recovery.

Color-blindness. See **Hygiene, Care of the Sight.**

Coma. Deep stupor, from which the patient cannot be aroused. It is met with in *apoplexy*, *fracture of the skull*, *dead-drunkenness*, and opium-poisoning.

Comedones. See *Acne*, under **Skin Diseases.**

Congestion. Accumulation of blood in a part of the body, more than is natural. *Active* congestion exists when the blood flows through an organ in unusual amount; *passive* congestion, when it collects without quickly circulating through it.

Congestive Fever. Better named **Pernicious Fever**; which see.

Conjunctivitis. See **Eye, Diseases of.**

Constipation. See **Hygiene**, on the **Excretions.**

Consumption. *Pulmonary* Consumption (that is, of the *lungs*) is commonly meant by this; called *phthisis pulmonalis* in medical works. Some families are particularly liable to this; several of their members, occasionally all, dying of it. Other cases begin after an attack of illness, especially a *bad cold* (bronchitis), *measles*, or *whooping-cough*. Sometimes, however, consumption begins without any such antecedent; perhaps first with loss of appetite and weak digestion; then a *hacking* cough, slight, but continued; pallor, loss of flesh and strength.

No time of life is entirely free from the possibility of the setting in of Consumption; but much the greatest number of cases occur between the ages of fifteen and thirty. Fewest, perhaps, are those which take place in childhood.

Galloping Consumption (*acute phthisis*) goes through all its course, ending in death, in from four or five (seldom) to eight, ten, or twelve weeks. Much more often Consumption lasts for one, two, or more years; rarely, a dozen or twenty years. More than half the cases reach their end in from eighteen months to two years.

Cough, at first hacking (unless it follows an attack of bronchitis), and gradually deepening and increasing in violence, is one leading symptom. As the disorder advances, *shortness of breath* becomes more and more troublesome. *Expectoration* is at first moderate in amount, and whitish or yellowish-white; it becomes thicker and thicker; more and more abundant, streaked with blood, yellow or greenish-yellow; at last it comes in roundish lumps, which will not all float on water. *Wasting* of the body is what has given its name to the disease, Consumption. Appetite is poor, digestion difficult; late in the case, *diarrhœa* comes on. From the first, the *pulse* is usually quickened. In an advanced case, *hectic fever* is characteristic. It comes once (possibly, though rarely, twice) a day, mostly in the afternoon; with heat and dryness of skin, greater rapidity of the pulse, and a bright red flush in the middle of each cheek. *Copious perspiration* (night-sweats) also marks an advanced condition of the disease. The hair falls out, the eyes have a pearly lustre, the joints look as though enlarged, the feet swell, the voice is enfeebled, the night is disturbed with wearisome spells

of coughing; *hemorrhage* from the lungs occurs, early or late, perhaps several times, in two-thirds of the cases. Yet, with all these distresses, wonderful cheerfulness and hopefulness are more common than the reverse. Towards the very last, in a protracted case, *delirium* may come on. *Pleurisy* now and then complicates the trouble. Death may result either from gradual exhaustion, copious hemorrhage, excessive collection of phlegm which cannot be coughed away, or the sudden breaking of an abscess (*vomica*) of the lung, producing suffocation.

Prevention of Consumption, in those whose family or individual history shows predisposition to it, has been considered under **Hygiene** (that of the **Breathing** organs and their function). Its *treatment* is as much hygienic as medical. Whatever promotes or economizes strength favors delay in the progress of the case, and adds to the chances (which are not many, but exist) of recovery. Nourishing food, including milk (never skimmed, but rich with cream), beef-tea, and whatever else, easily digested, the appetite will accept, are proper. *Cod-liver oil* is a naturally prepared medicinal food. A tablespoonful of it thrice daily will not be too much, if the stomach will bear it. Get a good, reliable, not too thin, oil. Cod-liver oil *is* nasty; but most people can get accustomed to it, and can take it after a mint-drop, or in the froth of ale, or in coffee; or alone with the addition of a little salt, as if it were fish. *Gelatin capsules* of it are now sold, which prevent its being tasted at all. Warm weather makes it harder to take cod-liver oil. Some can only bear it in the winter; a few cannot take it at all. For these, *cream* or rich milk will be a tolerable substitute; and plenty of good strong *beef-tea* (two pounds of beef to a pint) will help in the same direction.

Dr. Robert Koch, of Berlin, in 1890, announced his supposed discovery of an almost certain cure for consumption of the lungs and other tuberculous diseases, in their early stage, by injecting under the skin a few drops of an extract of tubercle dissolved in glycerin. This, he thought, would cause the tuberculous matter to be thrown off, and would prevent the progress of the disease. Great hopes were excited, and scores of patients, in Europe and America, were subjected to this treatment. A number of them seemed for a time to improve under it; a few were apparently made worse by it; and within six months it was given up by most physicians. The idea of this treatment was suggested by the belief that tubercles in the lungs and in other parts of the body are caused by minute *bacilli* (seen only through a microscope).

Various *tonics*, especially *iron* and *quinine*, are often given in Consumption. These may be left to the attending physician; as may also be the *cough medicines*, after a few words of remark. A weak stomach

must not be worried with medicine of any kind, in such a weakening disease. *Syrup of wild cherry bark* will be a good expectorant early in the attack; adding to it *paregoric* in small doses, when the cough grows troublesome, at night. Wistar's cough lozenges will also then come in well. At a late stage, *solution of morphia* is usually relied on to promote night-rest.

Keeping the *skin warm*, by sufficient clothing, especially about the chest, is very necessary. Flannel under-clothing will be best, with an extra rabbit-skin, or doubly thick flannel, over the breast. Dr. Mays, of Upper Lehigh, Pa., asserts the cure of several cases of consumption by thoroughly warming the patients' chests, in a manner thus described by him:

"I had lately made, by Messrs. Tiemann & Co., of New York, a steam-jacket of tin metal, which, from a somewhat protracted use, seems to fulfil all the ends I had originally in view. The inside surface of the jacket is covered by a lining, an inch in thickness, composed of cotton wadding, covered with several thicknesses of flannel. This lining is moistened with water and heated before the jacket is adjusted to the chest. Thus arranged, it will be observed that it strictly fills all the requirements of a strong and powerful external stimulant, and, while its action is the same in kind to that of a hot flaxseed poultice, only a great deal stronger, it possesses many prominent advantages over ordinary poultices and other appliances previously employed. It envelops the whole chest completely. It is light and readily adjusted. It retains its position on the chest without difficulty. It is easily managed and operated. It maintains a constant and uniform temperature. It requires no renewal every hour.

"The patients are allowed to remain in the steam-jacket for a varying period, from two to five hours each day. The steaming, besides causing an intense thirst, also calls forth a copious perspiration, and, as a precautionary measure against a too sudden change in the bodily temperature, the patients are advised to dress dry and go to bed, cover up well immediately after the jacket is taken off, and to remain there until sufficiently cooled off. The thirst is so great that a patient frequently drinks from two to three quarts of milk, or of milk and water, during three hours' steaming." *

But the *air* is of more importance, perhaps, to a consumptive than anything else. Shall he change his climate? If he live in our Northern States, it will be desirable for him, when practicable, to spend the winter (from the first of November to the end of March) in the South; in

* Medical News, Philadelphia, March 8, 1884.

Florida, Colorado or California better than anywhere else. That is, if he is well enough to travel. If in the last stage of Consumption, a bed-confined invalid, it will be better to remain and die at home. I knew one consumptive to spend five successive winters in Florida and summers at Newport, losing very little from year to year. The first winter spent North, because of a lameness, was his last.

Yet pure air, even in the North, may answer well. Dr. Trudeau, in his sanitarium near Lake Saranac, Adirondacks, New York, reports recovery of many consumptives under a careful fresh-air treatment.

Convulsions. Under **Hygiene** of **Infancy,** a good deal has been said on this subject. Convulsions may be, at any age of life, either *occasional* or *habitual.* The time when occasional convulsions are much most likely to happen, is the period of *teething* (dentition); between six months and thirty months of age. They are also less dangerous then than later, although sometimes even the first one may be fatal. A grown person may have a "fit," when hurt by a blow on the head, when exhausted by bleeding, or when much agitated in mind. Also, the condition of pregnancy, and still more childbirth itself, predisposes to very serious (puerperal) convulsions.

Habitual convulsions are either *epileptic* or *hysterical.* In the former, the patient is entirely unconscious; knows nothing at all that is going on. In the latter, some consciousness is retained. The spasmodic muscular movements are usually less violent in the hysterical than in the epileptic convulsions; and the hysterical form is much the most frequently curable. Indeed, we may say that those having the former generally get well from them, and those affected with the latter only recover in exceptional cases.

Everybody knows a fit when he sees it; by the *regular jerks* of the limbs and muscles of the face, on one, or more often on both sides of the body. Epileptics also frequently foam at the mouth. Hysterical attacks have uncontrollable laughter or crying, in many cases, before the "jerks" begin; and during the latter, the body is sometimes rigid; perhaps arched, resting on the back of the head and the heels. After an epileptic fit, deep stupor follows in some cases; in others, temporary but violent and dangerous frenzy (madness).

What to do for a convulsion is tolerably simple. We can seldom shorten it much; but we ought to try to do so, and may succeed at least in not promoting its continuance. If the patient is known to be epileptic, he should be laid on a soft bed or pillowed-floor, with everything loosened about his neck, and as much fresh air around him as can be obtained. Then it will pass off in a few minutes. When a grown

person not epileptic has a convulsion, we should try to learn his previous condition and the cause of the attack. If he is of a full, strong habit, and the face is flushed, the head hot and the pulse strong, I think (but some other doctors may not) he ought to be bled moderately from the arm. Then apply a large mustard-plaster to his back, and cold water to his head. Also, give him a purgative injection into the bowels (if there is time for it). The same treatment exactly applies to *puerperal* (child-bed) convulsions, when there are proofs of a full-blooded and not exhausted state of the system. Otherwise (that is, in a weak and thin-blooded person of either sex), bleeding is out of place. A warm or hot bath will then be better; followed by mustard-plasters to the back, pit of the stomach, and lower limbs; taking care, of course, that the skin be not *blistered* by them. If the feet be cold, apply hot bricks, or bottles, or bags of sand or salt to them at once. (Be sure the hot bricks, if used, do not *burn* the patient; I knew that to happen once, as the poor fellow had no feeling at the time.) In weak, nervous cases of convulsions, *breathing ether* (or even chloroform) is often a good remedy; it is so in the full-blooded cases after bleeding or cupping to the back of the neck. This can hardly be ventured upon, however, in the absence of a physician.

For *infants'* convulsions (as said under **Hygiene** of **Infancy**), the same principles of management apply; only bleeding from the arm is almost never suitable, and, as a nerve-tranquillizer, milk of assafœtida, a tablespoonful thrown into the bowel by means of a small syringe, will be a help, if the fit lasts long. The *warm bath* also is more easily and beneficially used in infantile convulsions than in those of adults. *Lancing the gums* is a valuable means of relief, whenever they are swollen, or even tense and irritated (as shown by the child *worrying* with them before the fit). A clean cut down to the tooth is the right thing. A sharp penknife will do in the absence of a regular gum-lancet.

Prevention of Convulsions requires all sorts of care of the general health; adapted, of course, to what that may be. Some may require purging and low diet to render them less plethoric; more will need toning and building up. (See **Epilepsy.**)

Corns. A Corn is an overgrowth of the *epidermis* or outer coat of the skin. It is nearly always caused by *pressure*, as that of a tight or ill-fitting shoe. *Hard* Corns may be sliced off carefully with a sharp knife, not cutting "to the quick." Then put on the place two thicknesses of adhesive plaster, cut into little rings, and a third piece, not so cut, to cover the central part. This will protect from pressure, and allow the corn (at least after the same has been done several times) to stop growing.

A *soft* Corn is inflamed and tender. You must soothe it first, with bread poultices at night, and wearing, when moving about, a slipper or a shoe with a hole made for that toe. Then, when the soreness is all out of it, treat it with careful paring and plasters as above described.

Cough. See **Bronchitis, Hooping-cough,** and **Remedies,** p. 543.

Coup de Soleil. See **Sunstroke.**

Cow-pox. See **Vaccination.**

Coxalgia: *Hip Disease.* A chronic inflammatory affection of the hip-joint; one of the manifestations of a scrofulous constitution. It begins almost always during childhood. Pain is felt first in the knee; but the knee is not tender to the touch, nor swollen; and if the bent knee be tapped from below, it will hurt at the hip-joint. Soon the child gets to walking lame, bending the knee on the affected side so as only to touch the toe to the ground. After a while it is disabled from walking; the hip-joint is likely to have matter formed in it, and the head of the thigh-bone may undergo inflammatory decay (caries). It is not always so bad as this; if attended to early, recovery may take place in the course of a few months.

The principles of treatment are two: to *relieve the joint from pressure,* and to *build up the system* of the child. For the first, splints are made, with arrangements for stretching the limb, so that the head of the thigh-bone is kept from pressing into its socket; or, if the limb is not stretched (as was the older practice), it is at least kept at rest. The "building up" must be done by good food, salt baths, sea or mountain air in summer, iron, and cod-liver oil.

Cramp. A spasmodic contraction of one or more muscles. It does not always *shorten* the muscle, but only makes it hard and painful. Some, especially elderly, persons often have cramps in their legs and feet. Others get them on stepping upon a cold floor, or when bathing in cold water. Lives have been occasionally lost by a swimmer being attacked with cramp when in deep water. Epidemic *cholera* almost always has cramps of the limbs among its symptoms. They are much less common in cholera-morbus.

To relieve cramps, the best thing I know, besides sufficient warmth, is to *grasp* and *press firmly* the muscles affected. *Bandage* them tightly if the attack is obstinate, always being sure to apply the bandage to the foot as well as to the leg, so that the foot will not be made to swell from checking the return of blood through the veins.

Cramp of the **Stomach.** See **Colic.**

Cretinism. A kind of idiocy, with general stunting of the body, accompanied mostly by *goitre* (which see) of the throat. It is little known anywhere except in some of the valleys of the Alps.

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Croup. There are three varieties of Croup: 1. Sudden, *spasmodic night* Croup. 2. Moderately inflammatory *catarrhal* Croup. 3. Dangerously inflammatory *membranous* Croup. The second may glide into the last, unless properly treated.

Night Croup comes on without warning, at or before midnight, in children from two to four years of age. The child, well on going to bed, wakes with a short, barking cough, and difficult hoarse breathing. This difficulty is distressing. By giving it half a teaspoonful of *syrup of ipecac.* at once, and repeating this in fifteen minutes if not relieved, and yet again if need be, there will be, in most cases, ease given to the breathing, and the child will go to sleep. If vomiting follows the taking of the ipecac., no matter. If not, it will work off by the bowels in the morning. Should this dosing not at once answer the purpose, put the child for ten minutes into a *warm bath;* then wipe it dry and warm in bed, and bathe its throat with "hartshorn and oil"; that is, equal parts of either *water of ammonia* or *aromatic spirit of ammonia* and sweet-oil. When a child has *frequent* attacks of night-croup, *milk of assafœtida* is a good thing to add (in equal parts) to the syrup of ipecacuanha.

Fig. 216.

FALSE MEMBRANE IN TRACHEA.

Catarrhal Croup often begins in the night, though less suddenly; and while the above treatment relieves the breathing at the time, the child is not free from hoarseness and a short barking cough all day. When night again comes on, near midnight, its cough grows sharper, and the croupy difficulty of breathing returns. This is likely to happen three nights in succession; with prompt treatment, seldom more. We should, in this kind of attack, give a good dose of *purgative* medicine in the morning; citrate of magnesium or Rochelle salts will do. Also, keep the child in doors; in one room if the house is not equally warmed throughout. Give it small doses of syrup of ipecac. (ten to twenty drops, according to age) every three hours through the day; then half-teaspoonful doses, only if it has real distress of breathing, in the night.

Membranous Croup is a much more serious affair. Not a few physicians consider all cases of it to be examples of *diphtheria*. I am sure this is a mistake. I saw many cases of membranous croup (and medical books gave full accounts of such) years before diphtheria was known in this country. Diphtheria is an *epidemic* disease, and somewhat contagious from person to person. Membranous Croup is an *inflammatory* disease, occurring in children (and occasionally in adults) anywhere and

at any time. General Washington died of it. There is membrane formed in the windpipe in certain cases of diphtheria; but it is then *first* formed on the tonsils and in the "fauces"; that is, the upper opening part of the throat. In true Croup it is confined to the air-passages, the *larynx* and *trachea*, or, even, sometimes, extending down into the bronchial tubes.

We know a case of inflammatory, threatening to become membranous, Croup, by its beginning (at least as often as not) in the daytime; and continuing with little change through the day and night; also, and especially, by the fever that attends it. Always be concerned about a case of croup in which there is *fever* and *illness all day*. There are, however, times when the difficulty of breathing is worse. When the case goes on, these become more frequent and severe; and the breathing at last is no longer *hoarse*, but *hissing* and *whistling;* from the great narrowing of the windpipe, obstructed by *membrane* formed in it. If relief comes, the sign of it is a *soft mucous rattling* in the throat with the breathing. Otherwise, within two, three, or four days usually (sometimes less than two days), the windpipe becomes more and more obstructed, and death ensues at last from suffocation.

Fig. 217.

BRONCHIAL FALSE MEMBRANE.

Treatment of membranous Croup cannot be rightly undertaken by an unprofessional person. All that we can say here about it is, that, when no medical advice can be obtained, the pressing need of relief for the paroxysms of difficulty of breathing must be met (as in *night* Croup) by something *relaxing* which promotes *secretion;* and for this, ipecac. is the safest thing; to it being added half-teaspoonful doses of powdered *alum*, in a case of alarming obstinacy. *Tracheotomy* (opening the windpipe by an incision), the last resort of physicians in cases otherwise hopeless, will not, of course, be ventured upon by any untrained and unskilled hand. One measure may be mentioned as not difficult to carry out, and likely to soften the membrane, whose detachment gives the only chance of recovery; making the patient breathe *vapor* from water poured on *unslaked lime.* In the absence of an "inhaler," this can be done

most simply by placing a bowl, containing the lime and boiling water, under the upper sheet of the child's bed; it being then covered with the sheet, face and all, for a few minutes at a time. A teapot may be used instead, whose spout (when it is boiling) will give out the vapor from the lime near the little patient's mouth and nostrils.

I have seen recoveries from membranous Croup; but it is one of the most dangerous of the acute disorders to which children are liable.

Crusta Lactea. *Milk Crust;* an affection of the skin in young children. See **Skin, Diseases of.**

Cyanosis. The "Blue Disease." So called because the infant born with it is blue all over, from imperfect aeration of the blood. Its cause is incomplete development of one of the great blood-vessels (pulmonary artery) near the heart; or the non-closure of the opening, which exists before birth, between the right and left sides of the heart. There is no cure for this affection. All that can be done is to place the child on its right side at once after birth, and to make sure also that the trouble is not merely a temporary imperfection of breathing; in other words, that we have not a case of *asphyxia* instead of Cyanosis. We conclude that it is the latter only when the child breathes and cries as usual, and yet continues blue, as a permanent condition. Such a child seldom lives many days. Rare examples, however, have been known of those partially cyanosed surviving for years.

Cystitis. See **Bladder,** inflammation of.

Cysts. These are cavities formed in various organs, containing fluid. They originate either in the enlargement of a natural cell or cavity, or from the development of a parasite (cysticercus, hydatid) within the organ. *Ovarian* cysts are the seat of *ovarian dropsy.* On this, see **Women, Diseases of.**

Dance, St. Vitus'. See **Chorea.**

Deafness. This is of several kinds and different degrees. 1. Congenital; that is, being *born* deaf. Such children are also necessarily dumb—deaf-mutes. 2. From advanced age. This is partial only; mostly a dulness of hearing; and some old people do not suffer any such loss. 3. From disease, as small-pox, scarlet fever, or severe inflammation of the ear, destroying or impairing the condition of the *ossicles* (little bones), or the tympanic membrane, of the ear. 4. From a violent explosion near the head, rupturing the tympanic membrane. 5. Partial and often

Fig. 218.

EAR-TRUMPETS.

temporary deafness, from a "cold," thickening the drum-membrane, and obstructing the small canal between the ear and throat (Eustachian tube) with mucus. 6. Matter filling the middle ear, from inflammation. 7. Collection of wax, formed in excessive amount, in the outer channel of the ear.

The last of these is the only kind which can be properly attended to by any unprofessional treatment. Ears are almost as delicate and easily injured as eyes; they will not bear violence without injury. When wax is thick and over-abundant in the ear, the outermost part of it may be, gently and carefully, got out with an ear-pick. When some

of it remains at the bottom of the passage, it may be softened and loosened by repeatedly pouring warm water, or glycerin and water (equal parts), or almond-oil, into the ear from a teaspoon or a little glass tube with an elastic suction-end. Syringing is often used for this purpose, but the spoon-pouring is gentler and better. I have known persons to be made dizzy and faint by having their ears syringed.

There are specialists who practise ear-surgery, and who are called upon to treat cases of chronic deafness. Far be it from me to disparage their skill and ability; but they would probably acknowledge the great difficulty of their calling, and admit that it allows of fewer successes than are obtained by oculists.

Degeneration. See earlier in this volume, on the **Nature of Disease.** It may be added now, that degeneration consists in the substitution for healthy, active tissue in any organ or organs, of a *lower kind* of formation. So, in the heart, *fat* may take the place of muscular fibre (fatty degeneration); in the arteries, *mineral* matter may form instead of the natural coats of the vessels (ossification). There are also other kinds of degeneration. In old age, such changes are simply modes of slow decline of life, ending at last in death. Intemperance, over-fatigue, acute diseases, etc., anticipate old age in certain cases, bringing on degenerations in different organs, such as have been mentioned.

Delirium. A disorder of the brain, shown by random talking, gestures, and perhaps more active movements. It occurs often in fevers, especially in typhus and typhoid fevers. It is to be distinguished from *insanity;* in which there is a more lasting mental derangement. Delirium may come and pass away within a few hours.

Delirium Tremens: *Mania-a-Potu.* This is the most horrible kind of Delirium; commonly well named "the horrors." It is brought on by intemperance; most frequently from the use of distilled liquors (ardent spirits, that is, whisky, gin, brandy, rum), but sometimes from fermented alcoholic drinks. It may be fatal in a first attack. If repeated, it becomes each time more and more dangerous to life.

Trembling, as one symptom, has given part of the name of this affection. *Sleeplessness* also belongs to it. When the patient gets a long sound sleep, he almost always wakes up well, or nearly so. Weakness of the stomach, *loss of digestive power,* is another part of the worst cases, making it much harder to get them through the attack. But the most terrible part is the brain trouble; the mental affection. All kinds of dreadful images beset the victim, and seem real to him. Snakes, rats, wild beasts, and armed pursuing enemies, are around him day and night. The horror is in himself; most of all when alone, and in the dark. He might say with Milton's fallen Lucifer, "myself am hell."

In rare instances only, the illusions which take the place of realities in this delirium are, though very real-seeming, without horror.

If ever obliged to deal with a patient so affected, remember, first, that the cause of his malady is *alcoholic poisoning.* He must be rid of that. If you are afraid (as many are) to stop abruptly his supply of drink, at least make him "taper off" rapidly. For his habitual half gallon or quart or so of whisky daily, substitute at once a tablespoonful every three hours; which will make about two wineglassfuls in the day and night. The next day make the interval twice as long—every six hours. Then withhold it all day, and give him a single wineglassful at nine or ten o'clock at night. Let him drink also a pint of hop-tea in the course of the day. If seeming strong enough to do right off without whisky, let him have for a few days a bottle of ale or porter daily.

Nourishment for such a condition must be strong and easily appropriated. *Beef-tea* (not filtered, but well skimmed), to which plenty of *red pepper* is added, may be given freely; in the weakest cases, beef *essence.* Any light animal food that he likes may be added; as chicken broth, etc. Milk will be very suitable if he will take it, as is sometimes the case.

If a *warm bath* can be prepared conveniently, a stay in it of half an hour, towards night, being rubbed dry quickly afterwards, will promote sleep.

As to *medicine.* If you must act in this emergency without medical advice, *laudanum* is, on the whole, the best resource. Begin at night, with thirty drops. Should he not sleep after three hours, give him thirty drops more. Then, if he continues wide awake, wait six hours, and begin with fifteen drops every four hours. Let the dose at half-past nine or ten o'clock at night be doubled—thirty drops. Dare we push this opiate treatment further, if it still falls short? I hesitate to recommend it to any unprofessional person. But I may say that I have known larger quantities of it, similarly used for four, five, or six days, followed at last by a long sleep and recovery. For other plans of treatment, the reader must be referred to professional medical works.

Dementia. Wreck of the mental powers; imbecility, coming on in a person whose mind was previously sound. It often follows acute or chronic insanity. It is more hopeless than *mania* or *melancholia,* the other chief varieties of mental derangement.

Dengue. See **Break-bone Fever.**

Diabetes Mellitus. A disease characterized by the presence of *sugar* in the *urine.* It is a wasting disorder, but slow in progress; often lasting for months or years, but seldom cured.

What does the sugar come from? Certainly either from the food

taken, or from the substance of the tissues of the body. Since the body wastes away gradually, and yet not very fast, and a good deal of sugar is passed daily, it is probable that both the food, after it gets into the blood, and the tissues, furnish the sugar. The *liver* always has in it some sugar after death, and contains a sugar-forming material, glycozen, during life. Whether the liver is to blame in this case or not, a bad habit of sugar-making exists in the system. How may we discourage (if not prevent), instead of promoting, this habit? Reasonably enough, it is thought, by letting the patient take *no sugar-producing food*. Not only sugar itself, but *starch*, everything containing starch, is to be withheld, in accordance with this view. As nearly all vegetables and fruits contain a great deal of starch, *meat* and *bran bread* are the chief ingredients of the commonly advised diet of diabetic persons. Milk is excluded, because it contains *lactose*, the sugar of milk.

As for medicines, there will always be time enough for these to be considered and directed, in Diabetes, by a competent medical authority. To discover the sugar in the urine requires some knowledge of chemistry. (See "Essentials of Practical Medicine;" or works on Medical Chemistry.) There are no special symptoms of Diabetes Mellitus (beyond the discharge of a very large amount of *heavy* urine) sufficient to make certain the presence of the disease without a chemical analysis of what is passed.

Diet tables for Diabetic patients have been constructed. The following will answer for that purpose. One so affected should **not** eat:

Sugar, in any condition.
Wheat, rye, or Indian corn Bread.
Potatoes, Turnips, Parsnips, Carrots,
Peas, Beans, Rice. Arrowroot, Sago, Tapioca.
Pastry, Puddings. Fruit, fresh or preserved. Calf's Liver.

Diabetics **may** eat:

All kinds of butcher's Meat except Liver.
Ham, Bacon, corned Beef, dried Beef.
Poultry, Game. Fish, fresh or salted.
Soup (except vegetable), Beef-tea, etc.
Bran, gluten, or Graham Bread.
Cheese, Butter, Eggs, Cream.
Spinach, String-beans, Asparagus, Lettuce.
Cabbage, Cauliflower, Broccoli.
Tomatoes, Onions, Radishes, Celery.
Jelly, not sweetened. Custard, made without Sugar.
Nuts and Pickles in moderation.

Diarrhœa. Excessive and liquid discharges from the bowels. Sometimes this occurs by itself, but in many cases it is a symptom of a general disease; as in typhoid fever, cholera, and advanced pulmonary consumption. There is also a form of "consumption of the bowels," with wasting, in which diarrhœa is the most conspicuous symptom.

Diarrhœa by itself (idiopathic) is the most common in warm countries and in summer time. Infants are especially liable to it in summer. (See **Cholera Infantum.**) *Treatment* of Diarrhœa has been already considered pretty fully in this book under **Remedies**: *How to Check Diarrhœa;* which see, page 528.

Diathesis. A morbid constitutional condition or predisposition: as the *scrofulous*, *gouty*, *rheumatic*, or *syphilitic* diathesis.

Dilatation of the Heart. See **Heart, Diseases** of. Dilatation is enlargement of the heart, without thickening of its substance.

Diphtheria. An acute disease of the general system, with violent inflammation of the throat, in which a thick yellowish-white membranous deposit occurs, sometimes extending into the windpipe and causing diphtheritic croup. The disease is generally *epidemic;* but, with close contact, as kissing, or inhaling the breath of one affected, it has been shown to be contagious. Princess Alice of Hesse, a daughter of Queen Victoria, is considered to have been the victim of a kiss, by which she caught the disease from one of her children, just recovering from diphtheria. Several physicians have died of it, in consequence of inhaling the breath of patients on whom they were performing the operation of tracheotomy.

Although described as sometimes seen by ancient writers, and in modern Europe and America at long intervals (as in New England in 1736, and New York in 1771), Diphtheria never prevailed extensively either in Europe or this country before 1855–6. Now it is often absent from many places for years together, and then may break out, in a village quite as often as a city, or in a single family, even; destroying in such cases a number of lives in succession, especially among children.

As to the *causation* of Diphtheria, the two most important practical points are, one, that it is sometimes *personally contagious;* and the other, that it is *promoted by an impure atmosphere;* such as that of large tenement-houses, close alleys, leaky drains, stagnant sewers, etc. Reason exists for believing also that *impure drinking water* tends towards the same result. Diphtheria is, in part, like typhus and typhoid fevers, a filth-bred disease.

How shall we know an attack of Diphtheria from one of common sore throat? Unless Diphtheria is known to be prevailing at the time, do not suppose it at all probable that any case is of that disease. Multi-

tudes of people have *quinsy,* and greater multitudes slight inflammation of the *fauces* and *pharynx,* without any Diphtheria. In the latter, there is a severe illness: the throat is very sore; and, when you press down the tongue with the handle of a tablespoon, you may see on one side or both, back of the tongue, *patches,* whitish or dull yellowish-white (late in the attack sometimes almost brown), looking like hardened phlegm. They are almost of the nature of mucus, only more solid, and not separated from the lining of the throat. Be sure not to mistake for such diphtheritic deposits, either 1, small bits of *phlegm,* ordinary mucus; or 2, small *pimples* or enlarged and inflamed *follicles* of the throat. To make sure, let the patient (if old enough) wash out the throat with pure water; and then look again. If *mucus,* the patches will have been washed away. If either *pimples* (papules) or *enlarged follicles,* the washing will make their small size and regular rounded shape distinct. A diphtheritic throat, moreover, is *all* red and swollen with inflammation. Bad cases have this to extend also into the nostrils, with an acrid, nasty discharge from them. If there be a raw place anywhere on the body, as from a blister, diphtheritic membrane will be apt to form on it also.

Diphtheria is not generally a very rapid disease. Sometimes its progress for several days is gradual and insidious. The child or other patient does not appear to be so ill as he is. But in three days or so, most generally, it shows itself to be bad enough. Very many get well; but a considerable fraction of cases do not, but die within about a week. On recovery, great debility is commonly left, and sometimes *partial paralysis,* affecting the muscles of speech and of swallowing, or, it may be, the lower limbs.

What are we to do for Diphtheria? I am reminded by this question of what I heard a celebrated physician, the elder Dr. Hodge, of Philadelphia, tell of himself. When he had been some time in practice, and married, a child of his had a convulsion. "For heaven's sake," said Doctor Hodge, "somebody go and run for a doctor!" So I must say to the reader when a case of Diphtheria occurs: go for a doctor. It is impossible for me to dogmatize about its treatment. A dozen or two plans for it are set forth in medical books and periodicals. I will only say that those of my cases in practice have done best in which I gave early and large doses of *chlorate of potassium;* five grains for a child under ten years of age, and twenty grains for an adult, every three hours, dissolved in water. Of course the patient must be kept comfortably warm and quiet in bed. An early moderate dose of citrate of magnesium, or Rochelle salts, or Tarrant's aperient will be suitable. The throat may be bathed repeatedly outside with soap liniment or "hartshorn and oil," and gargled with alum water or a weak solution of chlorohy-

dric (muriatic) acid mixed with honey. One of the most agreeable and useful things, however, will be the swallowing slowly of small pieces of *ice*, at tolerably short intervals. Liquid food must be given from the start; milk, beef-tea, chicken-broth, etc. For the account of further particulars, and various modes of treatment, I must refer the reader to "Essentials of Practical Medicine," or some other professional medical work.

Diplopia. Seeing double; two objects instead of one. *Hemiopia* (more rare) is seeing only half of an object at a time.

Dipsomania. See **Methomania.**

Dissecting Wounds. Poisoned wounds, got while handling recently dead bodies; as in *post-mortem* examinations made by physicians, or in the dissecting rooms of medical colleges. Similar results follow from even very slight wounds, as the puncture of a needle or a pin, into which matter from ulcers, abscesses, or any unhealthy sores, has been allowed to enter. During my early medical experience, I suffered from three such wounds; two of them producing serious illnesses. They are often fatal. In my own, as in most other cases, inflammation of one or more of the lymphatic (absorbent) vessels took place. A bright red line, very tender to the touch, ran up my arm to the armpit. There, in my worst case, a glandular abscess formed, as large as an apple. When it softened and was opened, I began to improve and get well.

Prevention of such poisoned wounds is always attainable, even when one's hands are immersed in the products of decay and death. First, never touch such things if there is *the least scratch* on the hand. Secondly, if a knife, needle, pin, or edge of bone breaks the skin while at work in such materials, *at once wash* and then *suck* the part thoroughly; and do not expose it to the same things again. This is not a pleasant precaution, but it is very effective and important.

Diuresis. Excessive discharge of urine. *Diabetes* means the same thing; only in case of sugar being found in the urine the term *mellitus* (from *mel*, Latin for honey) is added to the latter name.

Dracunculus. Guinea-worm; one of the parasites which, in tropical climates, occasionally live in the human body.

Dropsy. A collection of watery fluid, either in the connective tissue all over the body, or in some of the great cavities; as *hydrothorax*, dropsy of the chest, *hydrocephalus*, of the head, *ascites*, of the abdomen; *anasarca*, general dropsy; *œdema*, watery swelling of a part of the body. Of the *causation* of Dropsy, enough for our purpose has been said under the **Nature of Diseases.** Concerning its *treatment*, see **Remedies**; under the heading *Dropsy* (page 548).

Drowning. See **Accidents and Emergencies**, in the last part of this book.

Dumbness. Every one born deaf must be dumb (mute), because, without hearing, he cannot learn to speak. Of latter years, a system has been invented by which deaf persons can, with long perseverance, be taught to speak by looking at and following the motions of the tongue, lips, and throat. A few are without speech from malformation or defect of the organs used; *i. e.*, the cords and muscles of the *larynx*, the organ of voice. *Impediments* of speech from such causation are not uncommon. *Idiots* (*born* imbeciles), and those who become imbecile from disease affecting the brain, are sometimes dumb, simply from want of sense.

Dysentery. An inflammatory affection of the lower bowel; with *frequent*, *small*, and *bloody* discharges, passed with pain and *straining*. The belly is tender to the touch or on movement; fever is often present in severe cases. Dysentery is most common in and near Philadelphia in August and September; but it may occur in scattered cases at any season. Some localities, especially in tropical climates, have it every year as a sort of endemic disease. Eating unwholesome food, as unripe fruit, is one of its causes; being suddenly chilled after great warmth is another.

In *treatment* of Dysentery, rest in bed is indispensable. A large warm mush and mustard poultice should be laid over the abdomen, and covered with oiled silk. At the very start, half a tablespoonful of castor-oil, with ten drops of laudanum and a tablespoonful of spiced syrup of rhubarb, will be a good dose. Leaving to the physician to prescribe the rest, it may be said that *ipecac.* in small doses (not more than a grain at once, best in pill) is one of the most useful medicines in Dysentery; *opium* has to be resorted to tolerably early, also in small doses; from one-eighth to half a grain, according to the suffering and number of discharges, every three or four hours; later, obstinacy of the case may require *sugar of lead*, half grain to a grain several times a day, as a sedative astringent; and *laudanum and starch injections* into the bowels (twenty, thirty, or forty drops of laudanum in a tablespoonful or two of starch) constitute an important part of the management of severe cases. Food only of the simplest and most soothing kind is allowable in Dysentery; arrowroot, sago, tapioca, corn-starch, made with milk to make them more nourishing, will be the best things; with rice-water for a drink. Chicken-broth may be the first variation from these; afterwards beef-tea, etc. In convalescence, care must be used not to get up and move about too soon; also, not to venture on all kinds of food before the bowels are altogether settled. *Chronic* Dysentery depends

usually on ulceration of the lower bowels. It is sometimes difficult to cure, even under the care of a skilful practitioner.

Dysmenorrhœa. Painful menstruation. Some women suffer considerably every month; others only occasionally. Besides such treatment as belongs to professional skill and experience, *domestic* precautions and measures suitable are these: Avoiding fatigue of body or mind for a day or two before, as well as at, the regular time for the change; remaining at rest in bed or on a couch through the needful time; applying a flannel wrung out of *hot* (not merely warm) water over the lower abdomen; and taking some warming antispasmodic or anodyne drink. Such may be spirit of camphor, twenty drops, with compound spirit of lavender a teaspoonful, in a wineglassful of hot water, in a mild case. In a severe one, a teaspoonful or two of paregoric should take the place of the camphor; and such a dose may be repeated, if pain is great, in two or three hours. Married women who have children are likely, if subject before to Dysmenorrhœa, to get rid of it.

Dyspepsia. Habitual indigestion. Its most common causes are, eating indigestible food; taking too much food; eating too fast; swallowing the food without proper chewing; and mental worry. I have known it to be produced in a workingman by drinking a bowlful of strong coffee three times a day. Symptoms of Dyspepsia are: pain or discomfort in the stomach, increased after eating; belching, from flatulence; sour taste in the mouth; sometimes "water-brash," *i. e.*, a fluid coming up from the stomach into the mouth; in certain instances "heartburn," the feeling really starting in the stomach, though seeming to be about the heart; poor appetite; constipation of the bowels; low spirits (*hypochondria*). Some dyspeptics cannot forget their stomachs at all, and also compel all their acquaintances to remember their unhappy condition. This is often a very hard disorder to cure; but it is not immediately dangerous to life.

Treatment of Dyspepsia requires, first, great care in the *diet*. When everything disagrees, the patient is often not a good judge of what is best for him. Meat, tender and good, especially beef, lamb, turkey, and chicken, must, with stale bread, oatmeal mush, and crackers, make the bulk of his nourishment. He must eat slowly, take time for it, with his mind as much at ease as possible.

Secondly, his *habits* of mind and body must be improved. Something to do every day, will be advantageous; *exercise* out of doors is very important; but over-fatigue, and worse, over-worry with business, will not suit him at all. Let him always sit awhile, talking or reading (not studying), after a meal.

Thirdly, *constipation* must be relieved. Fresh fruit, especially peaches, or the best apples, or in their absence stewed prunes or dried peaches, will generally help much. Rhubarb is the best of medicines as a "peristaltic persuader" for the dyspeptic. Friederichshalle or Hunyadi Janos water will do now and then for a change.

Fourthly, *tonics* are appropriate, especially the simple bitter tonics; as gentian, quassia, columbo, etc. Probably the most convenient of all is the compound tincture of gentian; a small dessertspoonful, in a little water, after each meal.

Fifthly, *acidity* may be counteracted by occasional doses of lime-water, soda, potash (bicarbonate of potassium), or, when costive, magnesia. Vichy lozenges and "soda mints" are good for this purpose.

Sixthly, although the poor and irregular meals often necessarily taken in travelling are not beneficial, yet *change* of place, scene, and diet is generally good for a dyspeptic person. It helps to get his attention away from his own ailments; and it is a fact about a disordered stomach, that the more you think about it the more it won't behave itself.

Dyspnœa. Difficulty of breathing. It is met with in croup, asthma, dilatation of the heart, dropsy of the chest or abdomen, epidemic cholera, and some other affections. Its worst degree (short of *asphyxia*, suffocation) is called *orthopnœa;* the patient being obliged to sit up in order to breathe at all. *Treatment* of it belongs to the disease which causes it.

Dysuria. Difficulty in passing water. See **Urine, Retention of.**

Earache. Most common in infancy and childhood. When a baby too young to talk screams with pain, not relieved at all by a hot flannel over its stomach, and not accounted for by *pins*, hunger, thirst, or temper, touch the central part of its ear. If this, on pressing it, makes it shrink and cry more loudly, you may be pretty sure it has Earache. Drop into it, first, a teaspoonful of *almost hot water*. Should this not seem to do good, follow it with two drops of *warm sweet-oil*, added to *one drop of laudanum*. Obstinate cases may be treated with poultices to the ear, of hops, mush, etc. For these send for a doctor.

Ear, Inflammation of: *Otitis*. A painful ear, continuing so all day, and tender to the touch, must be inflamed. This may be, and often is, a slight affair, which will get well of itself in a few days; but sometimes it is extremely severe, possibly extending to the brain. A bad case will end in the formation of pus (matter), which discharges either through the outer channel (meatus) of the ear, or, more slowly, by the Eustachian tube, into the upper part of the throat.

Very little treatment is available for ear inflammation. Almond oil to drop in, is soothing; and so is gently applying, all over the margin of the ear-opening, the *cold cream* of the apothecary. Severe pain may be relieved, as in simple earache, by a drop of laudanum, followed by a poultice of hops or warm mush.

If a poultice is used, it ought to have a piece of fine gauze between it and the ear, to prevent the material from getting into the passage. *Leeches* are often applied with good result to an acutely inflamed ear; and, at a later stage, a *small blister* just behind the ear may hasten the cure.

Ears, Ringing in: *Tinnitus Aurium*. This may have several causes. If it be in one ear alone, it is almost certainly due to some fault in that ear. When both ears are alike affected, the cause may be in the ears, or, quite as often, in the general state of the brain. *Quinine*, taken in large doses, produces in most people ringing or roaring in the ears; and so does salicylic acid. Staying in the house for days together without exercise will bring it on in some persons.

General nervous exhaustion is frequently attended by it. All these are causes affecting both ears, through the condition of the *brain*.

In the ear itself, obstruction to the conduction of sound, as by wax, or the stoppage of the Eustachian tube, will sometimes cause this symptom. It also comes, with dizziness, as premonitory of *Menière's disease*. This is a rare affection. On the whole, while it is unpleasant, ringing in the ears alone, without other signs of serious disorder in the brain, does not necessarily indicate anything very dangerous.

Eczema. A disease of the skin, with a more or less watery eruption, often scabbing. See **Skin Diseases**.

Elephantiasis. Enlargement of a limb, or of the neck or trunk, "elephant-like." See **Skin Diseases.**

Embolism. Obstruction of a blood-vessel by an *embolus*; that is, a small fragment of blood-fibrin washed through the circulation from an organ which is the seat of inflammation. An embolus, acting as a plug, may so arrest the supply of blood by an artery as to cause the death of the part (as an arm or leg) by mortification (gangrene).

Fig. 219.

PLUG (EMBOLUS) OF ARTERY.

Emphysema. *Distention* of the cells of a lung, or of the connective tissue under the skin, by *air*. It is not a common occurrence, in either situation.

Empyema. A collection of pus in the pleural cavity of the chest; following pleurisy, or suppuration of the lung from inflammation and abscess. Most frequently it is the result of severe pleurisy. If a spontaneous opening between the ribs does not give it exit, physicians often deem it best to let it out by an operation; as pus will not, like serum, be absorbed, and is always a source of danger to life when it remains in any cavity of the body.

Endocarditis. Inflammation of the lining membrane of the heart. It is attended by much distress, and may be fatal in a few days. When not so, lasting injury may be left, in changes in the *valves* of the heart. See **Heart, Diseases of.** Inflammatory Rheumatism is the principal antecedent of endo- as well as of pericarditis.

Enteric Fever. See **Typhoid Fever.**

Epilepsy. The "falling disease;" habitual or periodic convulsions. The patient falls, after little or no warning, becoming unconscious at once. His limbs jerk, and his jaws are closed with violence; sometimes biting the tongue. Foaming at the mouth is common. In a few minutes, usually, the attack is over; but drowsiness, perhaps stupor, or occasionally wild frenzy, follows in a certain number of cases. The fits may come every day or oftener; or at intervals of days, weeks, or months. Epilepsy is hereditary in some families. Otherwise, it may be brought on by sensual excesses, abuse of tobacco, fright, or any other cause of great nervous disturbance or exhaustion. It is very hard to cure. Bromide of potassium has more power than any other drug in lessening the number of fits; but its large administration has inconvenient effects on the system. Epilepsy, after long continuance, mostly impairs the condition of the mental faculties. Yet several of the most celebrated men have been epileptics: Cæsar, Mohammed, Petrarch, Newton, Peter the Great, Napoleon I., Lord Byron.

Epithelioma. A tumor or morbid growth, consisting chiefly of the minute forms called *epithelial cells;* such as are natural to the surface of the skin, and to the mucous lining of the mouth, throat, etc. When these multiply irregularly, or are found growing in parts to which such cells do not naturally belong, the tumor is considered *cancerous;* and, as a rule with very few exceptions, it is incurable. Sometimes, when cut away, or otherwise destroyed, *very early*, it does not return. Microscopic examination is necessary to determine the nature of such a tumor.

Eruptions. See **Skin Diseases**; also, **Exanthemata.**

Erysipelas. A *spreading* inflammatory affection of the skin. Beginning mostly, but not always, at a part which is inflamed, or which has been wounded in some way, it extends gradually over the skin. Sometimes a large part of the body is thus involved. Worst of all is Erysipelas of the *head;* as delirium and other signs of inflammation of the brain may then follow, indicating great danger. Elsewhere, how ever, extensive Erysipelas may exhaust the strength, very much as in the case of a burn over half of the body; or deep inflammation, even of one or two of the limbs, may cause so much formation of pus under the skin as to give great trouble.

Erysipelas prevails especially in *ill-ventilated hospitals.* Now and then, however, a single case occurs, under other circumstances, which we cannot explain. It is not contagious from person to person. Contact with it, however, seems to give a liability to generate the infection of *puerperal fever.* Physicians and nurses should never go from attending upon or visiting a case of erysipelas to take charge of a case of labor.

Early local treatment may avail much in this disease. When the first burning sensation, with tenderness to the touch and redness, comes on in a part, apply to it at once and repeatedly fresh *cold cream* or pure *tallow* or *lard.* As a conflagration may be prevented by the timely use of a bucketful of water, so we may prevent, at the start, a possibly very serious attack of Erysipelas.

In treatment of the disease, when fairly developed, nothing is gained by trying to *suppress* the eruption. *Soothing* it is very proper; as by oxide of zinc ointment, weak lead-water, lime-water and oil, etc. *Heading it off,* to prevent its extending from the trunk or face to the head, is an old expedient; sometimes it may succeed, but not always. It is attempted by painting the skin thickly with *tincture of iodine, just beyond* the inflamed part. *Cooling* medicine, as citrate of magnesium or Rochelle salts, citrate of potassium, acetate of ammonium, is appropriate to the early, feverish state of an attack of Erysipelas. Simple, unstimulating, but nourishing liquid diet is also in place; milk, beef-tea,

oatmeal gruel, etc. Under such a simple treatment, I have seen a large number of cases of this disease recover, in hospitals as well as in private practice. The most trusted remedy for Erysipelas, however, with most physicians at the present day, is *tincture of the chloride of iron;* fifteen or twenty drops every three or four hours. Some also give alcohol freely to erysipelatous patients. That some of them, especially in hospitals, may require it, is entirely probable. I must mention, however, that of all the cases of Erysipelas under my care in twenty years, *all* of whom got well, not one took, by my advice, a drop of alcohol.

Erythema. A mild superficial inflammation of the skin, spreading somewhat, but without the severity of erysipelas. See **Skin Diseases.**

Exanthemata. The acute eruptive and febrile disorders; namely, *small-pox, varioloid, chicken-pox, scarlet fever,* and *measles.* Each of these has or will have its place and separate consideration in this alphabetical series. They all come out within one or two weeks after exposure to the contagion.

Small-pox has the eruption to begin on the *third* day, as pimples, becoming watery, and then suppurating, pitting, drying, scabbing, and falling off. It lasts in all about three weeks.

Varioloid resembles small-pox, except that in all respects it is *milder,* and runs its course in a shorter time.

Chicken-pox (*varicella*) looks like very mild varioloid, but with more scattered vesicles; coming out in successive small crops, and seldom suppurating. The whole attack may be over in from a week to ten days.

Scarlet fever has generally (in this like small-pox) pain in the head and back, with sick stomach, perhaps vomiting, at the beginning. On the *second* day, *soreness of the throat* appears, the throat and tongue being very red. About the same time, *bright diffused redness* is seen on the face, trunk, and limbs, increasing until, in marked cases, the whole surface of the body has a red and swollen look, with a very hot fever also.

Measles does not have the eruption to begin until the *fourth* day (sometimes later). *Cough* and redness of the eyes and running at the nose come sooner, perhaps with the first *malaise* of the beginning sickness. The measles eruption is in irregular patches or "blotches," and, on looking closely, we see that it is made up of small pimples, larger than any seen in the scarlet fever eruption. The redness, moreover, is less bright, and the heat of skin less intense, than in that malady. Soreness of the throat is occasionally met with in measles, but it is not a characteristic symptom. The duration of measles is from seven to

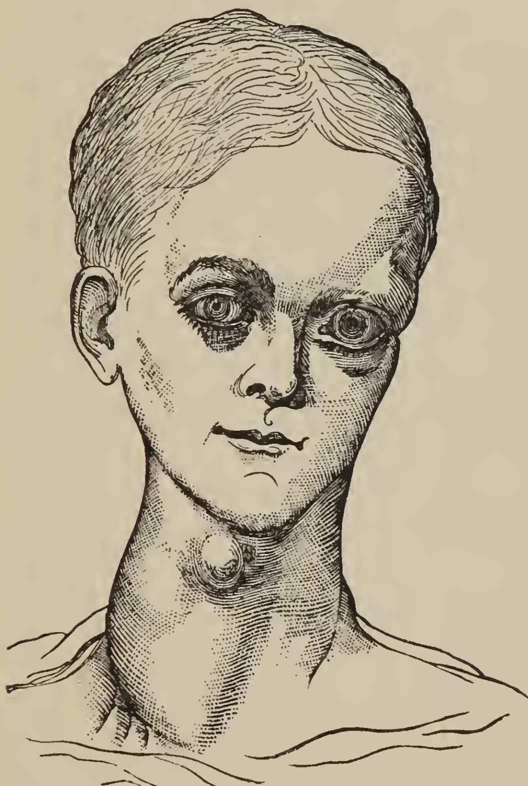
SCARLET FEVER

MEASLES.

ten days; of scarlet fever, about the same. Measles may leave behind it *weak eyes,* or a *chronic cough.* Scarlet fever, if severe, may, though recovered from, cause *blindness* or *deafness.* More often it is followed by *dropsy.* Scarlet fever is, of the two, much the most dangerous to life.

Exophthalmic Goitre. A singular disease, in which the eyeballs protrude, the throat swells as in common goitre (bronchocele, Derbyshire neck, enlargement of the thyroid gland), the heart and arteries throb

Fig. 220.



EXOPHTHALMIC GOITRE.

with violence, especially upon exertion. It is a disorder of long continuance, sometimes recovered from, but far from always. Its treatment is difficult, and a subject of different opinions among physicians. The two remedies that I have seen do the most good in its management are *digitalis* and *iron.* It is very important for the patient having it to avoid hurrying the action of the heart by quick or laborious movements of any kind. The nearer *at rest* from exertion he is, the better. (Fig. 220.)

Eye, Diseases of. *Inflammation* of the eye may affect only the surface covering of the eyeball and lining of the lids, when it is called *conjunctivitis;* or the cornea, *corneitis;* the hard fibrous coat, *sclerotitis;* the ring around the pupil, *iritis;* or the retina, *retinitis.* A *general* inflammation of the eye is called *ophthalmia.* This is common; but the degree in which the different coats are involved varies much.

In home practice, the care of *conjunctivitis* is most likely to occur. In that, the eyelids and ball are red, the lids swollen; moderate pain and great soreness of the eye are felt; light cannot be borne with comfort. All use of *both* eyes must be given up for the time. Iced sassafras-pith water may be applied freely and often over both closed lids, with a camel's-hair pencil; or, less beneficially, by laying a light rag wet with it upon the eye. The patient must remain in a rather dark room during the height of the attack; but this must not be continued many days, as it is unfavorable to the general health. Leeches may do good in a severe case, in which the whole eye is painfully affected. An obstinate case, especially if *both* eyes are inflamed, may also call for the application of a small blister across the back of the neck.

Chronic conjunctivitis is attended by an enlargement of the superficial blood-vessels, causing "granular lids," which continue red and swollen, the eyes being irritable and "weak." Having suffered much inconvenience from this during the first twenty years of my life, I may here mention what (after trying many things) most aided in curing it. This was the frequent painting of the *outer* surface of the lids with *lead-water;* using a soft camel's-hair pencil. My lead-water was made by putting one drop of Goulard's extract of subacetate of lead in about a fluid-ounce of clean water; and my custom was for years to return to it whenever March winds, or any outer cause, renewed the irritation of my eyes. After the lead-water, anointing the lids at night with cold cream is a good practice.

Sclerotic inflammation is in most cases rheumatic in origin; fibrous tissues are the ones generally subject to rheumatism. It is more painful than conjunctivitis; but it is much less common. *Wine of colchicum root* is an anti-rheumatic remedy, and *oil of cajuput,* on the same indication, may, in sclerotitis, follow a brisk saline purgative dose. Rags wet with laudanum may be laid upon the eye from time to time to assuage the pain.

Iritis is not very common, but is in many cases connected with constitutional *Syphilis.* When there is room to suppose this (or, indeed, whether so or not), calomel, blue mass, or the protiodide of mercury, will be likely to be prescribed by the medical attendant in the case.

Retinitis and *optic neuritis* (inflammation of the optic nerve), as well

as *corneitis* and *choroiditis*, are too difficult of diagnosis and special management to be considered except in professional works.

Blindness may be caused by: 1. Failure or paralysis of the "eye-brain" or of the optic nerve, as happens in some old people, and in what has been until lately called *amaurosis*. 2. Cataract; that is, opacity of the crystalline lens in the centre of the eye. This opacity may, in an advanced case, be easily seen, as a milky appearance, behind (seemingly in) the pupil. 3. Destruction of part of the refracting apparatus by disease, as small-pox. 4. Opacity of the cornea, which is the transparent coat at the front of the eyeball, set (like a window in a sash) in the sclerotic coat. Other causes of partial or total blindness exist, but these are the most frequent and important.

Oculists have pushed their special studies and experience so far of late years, that even general practitioners of medicine and surgery are accustomed to leave, when they can, the treatment of eye affections to them. It will, therefore, be quite beyond our present scope to go farther into that subject. On *errors of vision*, and their *correction*, see **Hygiene**: **Care** of the **Eyes**, page 402.

Faceache. *Tic-douloureux* (popularly called "tic doloroo!"). See **Neuralgia.**

Facial Palsy. Although not unfrequently consequent upon brain disease, palsy of one side of the face is, in the larger number of cases, especially in young subjects, the temporary result of inflammation from cold of the sheath of the "seventh nerve," which passes through an opening just below the ear. The effect of it upon the countenance is odd. The patient may smile with the healthy side of his face, while the other side is quite without expression. As above said, such cases recover, as a rule, in a few weeks, requiring little if any treatment, besides what is suggested by the "cold" in which the trouble took its rise.

Fainting. *Syncope.* Under some depressing or exhausting causation, the heart gives out, and refuses to send blood to the brain and other parts. Therefore, becoming unconscious, the person falls, unless supported. The face is pale, the pulse absent, the skin cold, the breathing almost null for the time.

What shall we do? *Lay the fainting person down* at once, so that aired blood may flow from the heart and lungs to the head, reanimating the "centre of respiration" (medulla oblongata) as well as restoring consciousness. Keep all crowding at a distance. Open the windows to let in fresh air; or carry the "faintee" out, still in the horizontal position. Sprinkle cold water in her (it is mostly a woman) face. If at hand, hold smelling salts (ammonia) near, but not too near or too long, to her nostrils. So, a mere faint will soon pass off. If kept in the erect position, in the midst of a crowd in a close room, one who faints may have the "syncope" to pass into actual death.

Prevention of a faint, when threatened, may be had upon the same principle; by the person who feels like it dropping a handkerchief, or anything else, and *stooping down* to pick it up. This will attract very little attention; and the lowering of the head will be apt to freshen up the brain and avert the attack.

Famine Fever. See **Relapsing Fever.**

Fatty Degeneration. As before spoken of, this is the substitution of fat for higher tissue, such as muscle, liver-substance, etc., of different organs. Fatty degeneration of the *heart* has been most fully studied by physicians. It is not common before late middle life. Coming on gradually, its existence may for a long time not be discovered. Sometimes only death makes it certain. Its signs are those of weakness of the heart; especially a sense of exhaustion and shortness of breath on exertion. The pulse is usually feeble and slow when at rest, often irregular. Fainting spells may occur; sometimes with snoring respiration, like apoplexy; but unlike that, in passing off with no succeeding palsy.

Also, in the "syncopal apoplexy" of heart degeneration, the skin is cold, the pulse weak; while in true apoplexy, the head at least is warm, the face flushed, and the pulse full and slow.

Fatty degeneration is not curable. What can be done is to husband the strength, and avoid trying the heart by any great or sudden exertion or excitement. *Rupture* (breaking or tearing) of the fatty heart is a not uncommon mode of death in those affected with it.

Favus. A very disagreeable disease of the hairy scalp. See **Skin Diseases.**

Felon. A severe inflammation of a finger, ending in suppuration. If the matter forms or finds its way under the fibrous sheaths of the tendons ("leaders") of the hand, it is very painful; and, unless opened by a surgeon, tedious. Professional opinion generally favors (besides poulticing with bread or flaxseed) early incision, down to the bone; so as to let out the matter before it spreads around in the deeper parts of the hand.

Fever. General remarks on this subject have been made under **General Disorders** (page 495). Medical text-books give account of the following varieties of Fever: *Cerebro-spinal, Intermittent, Remittent, Pernicious, Puerperal, Relapsing, Scarlet* (equally a fever with Measles and Small-pox), *Typhoid, Typhus,* and *Yellow* Fevers. On each of these something is said in the present alphabetical series.

Filaria. A genus of minute parasites of men and animals. One of them, *filaria sanguinis hominis,* swims about in the blood-vessels of human beings, in some tropical climates. Mosquitoes (or kindred insects) are charged, not without plausible evidence, with conveying them with their bills from one person to another.

Fissure of the **Anus.** See **Anus, Fissure** of.

Fissure of **Nipple.** See **Nipple, Cracked.**

Fits. See **Convulsions.**

Flatulence. Wind in the stomach or bowels; causing uneasiness and more or less pain, and tending to escape disagreeably either upwards or downwards. See **Dyspepsia** and **Colic.** For slight occasional attacks of Flatulence, ten or fifteen drops of Essence of Ginger, or five to ten drops of Essence of Peppermint (diffused in water), or five or six drops of Oil of Cajuput on a lump of sugar, or a "soda mint," will be mostly a sufficient remedy. The cure of the disposition to indigestion, however, which causes the flatulence, should be attended to, when it recurs often.

Frost-bite. Possibly sometimes the result of simple exposure of the feet to cold; more often, caused by suddenly heating them when they have been chilled. Coming in from walking or skating in cold weather,

and putting the feet at once to a hot fire, is an almost certain way of getting frosted feet. The manner of this is like that in which plants are killed by frost. Heat and cold alter the bulk of fluids more than that of the solids that contain them; and sudden expansion and then contraction, or *vice versâ*, bursts the delicate cells of the plant structure, and strains, if it does not burst, animal cells and tubes.

Frost-bite is an acute inflammation of the skin, thus produced. If the feet are actually *frozen*, mortification is endangered. Several of Dr. Kane's companions in his Arctic expeditions lost their toes in this way.

Treatment of Frost-bite (chilblain) may consist of the application, during the height of the inflammation, of lead-water, glycerin, and laudanum (a fluidounce, *i. e.*, two tablespoonfuls, of lead-water, half as much glycerin, and a teaspoonful of laudanum). Afterwards, bathing the feet morning and night in tepid oak-bark tea or alum water (precise strength not important); followed by cold cream or simple cerate. Cabbage-leaves are often used for this trouble in domestic practice.

Gall-stones. Hardened bile, of which small masses pass along the duct from the liver and gall-bladder to enter the duodenum (first part of the small intestine). Very severe pain attends this passage; relieved as soon as the gall-stone escapes from the bile-duct into the bowel. Occasionally such stones remain in the gall-bladder for a considerable time. In a few cases, the gall-bladder, or duct, bursts, letting its liquid contents into the abdominal cavity. This is a fatal accident. (Fig. 221.)

Gangrene. See general remarks (page 490) on **Mortification.** *Dry* Gangrene is the kind now and then seen in aged people, who thus die at the feet before the rest of the body. Signs of Gangrene are, coldness, "mushiness," blackness and loss of feeling in the part. Briefly, it dies and rots; then sloughing off;—a "line of demarcation" forming between the living and the dead tissue, if the process stops. Often, however, it goes slowly upwards towards the centre of the body, depressing vitality more and more until it ends in death.

To arrest the progress of Gangrene is often impossible. Strengthen-

FIG. 221.

GALL-STONES IN GALL-BLADDER.

ing the patient's system to endure it, and to throw off the dying part, is the main thing. Amputation of a limb is sometimes resorted to; this will only save life if mortification does not begin again in the stump. *Washes* of a stimulating character are suitable for Gangrene. I doubt whether any are better than *pure whisky* and *dilute nitric acid* (twenty drops to a half-pint of water), used, one or the other, twice a day. Charcoal poultices are sometimes applied for cleanliness (*powdered* charcoal mixed with bread and water). *Antiseptic* washes, to relieve the offensive odor, may be made of *solution of chloride of soda* (a teaspoonful of Labarraque's liquid to a half-pint of water), or *permanganate of potassium* (ten grains in a half-pint of water).

Gangrene of the **lung** is a rare but nearly (or quite) always fatal disorder. It is recognized by the horribly offensive putrid odor of the breath. Supporting measures, by *quinine*, *beef-tea*, *milk*, and suitable alcoholic stimulation, are all that can be done for such a case.

Gastric Fever. Old, rather than recent, medical books use this des-

ignation for cases, now recognized as not all of one character. Children, when suffering with indigestion, often have considerable fever with it; this is one variety. In children, also, *malarial remittent* may occur, with disorder of the stomach as a symptom; and *typhoid* fever, in children, has vomiting with it, tolerably often (in adults it is rare in that disease). Either of these may correspond with what, sixty years ago, was called Gastric Fever, or Infantile Remittent.

Gastritis. Inflammation of the stomach. *Acute* Gastritis, by itself, is very rare, except from an injury or from poisoning. Irritation, with moderate inflammation, of the *stomach, duodenum,* and *liver,* is what manifests itself in a bilious attack. *Chronic* Gastritis is not uncommon. It differs from dyspepsia (to which it has a resemblance so far as habitual indigestion is concerned) in the presence of tenderness on pressure at the pit of the stomach. Stimulating articles, such as ginger, pepper, etc., increase the distress of Chronic Gastritis. Bland, soft food is best for it; arrowroot, sago, tapioca, rice, lime-water, and milk. Medicine appropriate to it had better be left to the physician. Sub-nitrate of bismuth and nitrate of silver (pills of one-quarter grain, with one-quarter grain of opium) are favorites here with many practitioners.

Gin-Liver. *Cirrhosis; Hob-nailed Liver.* One of the results or manifestations of alcoholic poisoning; often brought on by long-continued intemperance. Symptoms of it are, indigestion, sickness of stomach, constipation, sallowness of complexion, debility, wasting, abdominal dropsy, and enlargement of the veins over the surface of the abdomen. *Treatment* of it is null, beyond breaking off alcoholic indulgence, and promoting the general health by attention to all the obvious needs of a failing system. The course of the malady generally occupies several months, ending with delirium, stupor, perhaps convulsions, and death.

Cirrhosis of the Liver, however, sometimes occurs *without intemperance.* It is a degenerative affection, and may, though seldom, be brought on by other causes which depress the vitality of the system.

Glanders. A contagious disease of the horse, now and then taken by grooms or hostlers. Beginning with inflammation of the nostrils, it extends to the throat, face, and eyes; with fever, pustules on the skin, and diarrhœa. Death results in three or four weeks.

Glaucoma. A painful disease of the eye, often ending in blindness. A characteristic of it is, excessive tension of the fluids of the eyeball; so that, to a delicate touch, it feels harder than natural. With the ophthalmoscope (a mirror throwing strong light into the eye, and pierced with a hole through which an oculist can look), there is seen a cup-like depression at the entrance of the optic nerve (*cupped disk*). For the *treatment* of Glaucoma, see special books on Diseases of the Eye.

Goitre. Enlargement of the thyroid gland, in front of the neck. It is occasionally met with in various places; but is very common in the valleys of the Alps, and in some other mountain districts. What there causes it is not certainly known. Excess of mineral substances in the drinking water is a possible cause; too little sunshine with too great dampness may be another; and a third may be (at least intensifying these) close intermarriage of families. *Cretinism*, which is a stunted condition of the body, with imbecility, often accompanies the Goitre of Switzerland. Both are found to be, if not curable, at least capable of much improvement, when their subjects are removed in early life to other and more healthy situations. For the treatment of Goitre as it may occur occasionally anywhere, *iodine* has a high reputation; but it is not an infallible remedy. See **Ophthalmic Goitre.**

FIG. 222.

GOITRE.

Gonorrhœa. A contagious disease of impure intercourse; for which, see works on Surgery.

Gout. Simple Gout is an acute and very painful inflammation of the toes and fingers, whose most frequent cause is high living; that is, free indulgence in wine or malt liquors, with rich animal food, and but little exercise. In rare instances, it comes without using any alcoholic beverages. Once fastened upon the constitution, it may (as a *diathesis*) show itself as *flying* Gout; now in the joints, and then in the stomach or the heart. Also, it is hereditary in many instances. Children of gouty parents, as they grow up, may have regular gout of the toes (*podagra*, or *arthritis*, of old medical books), or, as often, gouty attacks of the stomach, or dyspepsia, or neuralgia. The last-named is very common in such families.

In the *treatment* of attacks of regular gout, *colchicum* is a standard remedy; *wine of colchicum root*, in ten- to fifteen-drop doses. With it, at first, magnesia is a good medicine; afterwards, soda or potassa (bicarbonate of sodium or potassium) or lithia in moderate doses, continued for several days. The morbid agent of Gout appears to be an acid—uric or lithic acid—some of which is always present as a result of "waste of tissue," but which is in excess in the system in this disease. *Laudanum* may be applied on light rags (covered with oiled silk) to relieve the pain of the inflamed small joints. Sometimes Opium may be taken internally; especially in the form of Dover's Powder (see

Opium, under **Remedies**), both to relieve pain and to promote perspiration. Repeated gouty inflammations of the toes or fingers may leave the joints irregularly swollen with chalky deposits, which almost crumble under pressure. For gouty attacks affecting the **stomach** or **heart**, prompt use of anodyne and stimulant remedies is called for: a teaspoonful of whisky or brandy, or of Hoffmann's anodyne, followed, if relief does not soon come, by twenty-five or thirty drops of laudanum; also, a mustard-plaster over the seat of the spasmodic pain, and a hot mustard foot-bath, as soon as possible.

Gravel. Small stones, or sand, formed in the kidneys, and passing thence to the bladder. There they cause irritation, with pain or burning in passing water. Most generally, Gravel consists of particles or masses of uric acid or its compounds; the same that are found in excess in the blood in gout. Alkaline treatment is proper for it, along with something soothing, and a light, unstimulating diet. Bicarbonate of sodium ("soda") in ten-grain doses, with half-teaspoonful doses of sweet spirits of nitre, taken several times daily in flaxseed-tea, will usually give relief. The use of the sweet spirit of nitre is to increase the flow of urine, and so dilute and wash away the excess of uric acid or other deposit.

Grip or **La Grippe.** A common popular name for the epidemic of Influenza (page 744), which spread over the world in 1889, 1890, and 1891. Beginning in Russia in 1889, it moved gradually westward, affecting several countries in Europe, and finally also the United States and Canada. A similar but more irregular course followed in 1890, and again in 1891. Multitudes of people were attacked, especially in the large cities. More prostrating than former epidemics of Influenza, a considerable number of deaths were ascribed to it, and the general mortality was largely increased on account of the frequent complication of pneumonia and the aggravation by it of other diseases. In London, during one week in the early part of 1891, 500 deaths occurred from diseases of the breathing organs alone. In Chicago, during one week in March, 1891, 70 deaths were ascribed to the Grip and 240 to Pneumonia—an unprecedented mortality from such diseases. In New York, about the same time, 146 deaths from all causes occurred in 24 hours, and 196 policemen were at that time on the sick list, chiefly from the Grip. In Philadelphia it was not quite so bad, although almost every one had an attack; and in the week ending March 24, 1891, the deaths numbered 463, which was 17 more than in the corresponding week of the previous year, and largely beyond the average for that time in a number of years. In that week 54 deaths were ascribed to consumption of the lungs and 39 to pneumonia.

The Grip varies a good deal in its symptoms. So much, in the beginning, does it resemble a common "cold" that every one who has caught cold from any exposure is apt to suppose that he has "La Grippe." (This term is from the French, but it is considered in better taste to translate it into our good short English word, descriptive of the strong hold it takes—*the Grip.*)

Usually, first come headache, backache, often leg-ache, reminding physicians of *dengue*, or break-bone fever. But dengue has never spread over the world like this epidemic. Moreover, in almost all cases a cough occurs in the Grip, with running at the nose, and often sore-throat. Fever commonly comes on the first or second day. In a great number of cases it is slight, and passes off, as all the symptoms may, in one, two, or three days. In other instances it may last a week or two; rarely a slow fever keeps on for several weeks. Occasionally *delirium* occurs during the fever; some persons have, it is asserted, taken their own lives in the frenzy thus produced. Almost always recovery from an attack of this disorder is attended by *weakness* out of proportion to the violence of the symptoms, and this weakness may last for weeks, or even, in some degree, for months.

WHAT TO DO FOR THE GRIP.—In mild cases very little treatment is necessary. In all, *early simple* measures will be likely to have excellent effect. I have had some which began like severe attacks, to give way very promptly to this simple way of proceeding:

Give the patient first a tablespoonful of Tarrant's Aperient Powder, or of Rochelle Salts, or a wineglassful of Solution of Citrate of Magnesium. Put a *long mustard plaster*, half mustard and half wheat flour or Indian meal, and five or six inches wide, up and down the back, and leave it on until it burns quite smartly, so that he quite wishes to have it off. (When it comes off, if the skin feels sore, apply a large piece of linen or soft muslin, covered with tallow or "cold cream" of the apothecary, with another piece outside of this to keep the grease from the bed-clothing.) Give him plenty of lemonade to drink—cold if his fever is hot; hot if, instead, he inclines to be chilly. If his feet are at all cold, or even cool, let him sit, near bed-time, for five or six minutes with them in a pail of moderately hot water in which a handful of mustard has been stirred. If the cough is troublesome, make *flaxseed tea* (pouring a pint of boiling water on a tablespoonful of flaxseed, but *not boiling it*), and add lemon-juice and sugar, for his drink. Seven or eight out of ten cases of the Grip, treated *early* in this mild fashion, will get well without further trouble. The other two or three will need a doctor to take the responsibility.

Physicians are not all agreed as to the management of severe cases

of the Grip. Some will give a great deal of quinine; others, whisky right along, in considerable doses; still others, opium or morphia. Dover's Powders, which contain opium, are favored by many. Large use is made by a number of practitioners of a class of medicines called *antipyretics*, such as *antipyrin*, *antifebrin*, and *phenacetin*. In large doses these (of which the safest probably is Phenacetin) lower the heat of the body in fever by a powerful action on the nervous system. My impression is strong that the use of very *large* doses of quinine is not called for in the Grip; that whisky had better be omitted in the majority of cases; and that the employment of the "antipyretics" just mentioned is experimental; and as the mortality from the Grip has been greater than that of previous visitations of Influenza, such practice is not likely to be permanently confirmed and adopted.

For the weakness attending and following the Grip, nourishing food, as beef-tea, &c., is important, with avoidance of severe exertion, quinine (6 or 8 grains a day), iron in some cases, and, especially in summer, change of air—to the mountains or the sea-shore.

Guinea-Worm. See **Dracunculus.**

Hæmophilia. A special disposition of the body towards bleeding, even from very slight wounds; as lancing the gums, extracting a tooth, etc. This is uncommon, but runs in families. There is no known cure for it; but it should always be remembered in connection with the management of those who have such a family history. Operations which would be perfectly safe for others may, with them, be dangerous. Thus a well known clergyman of Philadelphia, in the prime of life, bled to death from the removal by a surgeon of a small wen on his side.

Hæmoptysis. See **Hemorrhages.**

Hay Fever. See **Asthma.**

Headache. Various causes may produce pain in the head; as, *fulness of blood* (congestion of the brain); *neuralgia; rheumatism* of the scalp; *blood-poisoning,* as by alcohol, etc.; *fever; uræmia,* from suppression of the secretion of the kidneys; *sympathy* with irritation of the stomach, bowels, or womb; *disease of the brain.* It is not always easy to make sure which of these accounts for a particular case of headache. *Fulness of blood* shows itself by flushing of the face and heat of the head; often, also, by the swollen arteries standing out at the temples. *Neuralgic* pain is almost always on one side (*hemicrania*), and extending down to the face; also, it is attended by tenderness on pressure. In *rheumatism* of the head, the muscles which move the head are apt to be sore on motion; and rheumatic symptoms occur in other parts of the body. *Blood-poisoning, fever, uræmia,* and *sympathetic* irritation are recognized in view of the history of each case. When *disease of the brain* is the cause of pain, it is usually confined to one spot, comes in spells or paroxysms, and is accompanied by other signs of disorder of the brain.

To *relieve* headache, we must endeavor to ascertain to which of these varieties it belongs, and act accordingly. There is, of course, no summary or universal remedy for it. See **Neuralgia,** and page 519.

Sick headache is a regularly or irregularly recurring affliction which some people are subject to all their lives. It may be hereditary, running through several generations. Coming on either gradually or suddenly, its subject is "laid up" for the time by its severity, with more or less nausea, perhaps vomiting, for from one to three days. *Cure* of the tendency to such attacks has baffled many a physician in its search. If anything will ward off the expected "spell," I believe it will be the use, from the first moment of threatening, either in the stomach or in the head, of *compound gentian pills* (see **Gentian,** under **Remedies**), two twice daily for two days.

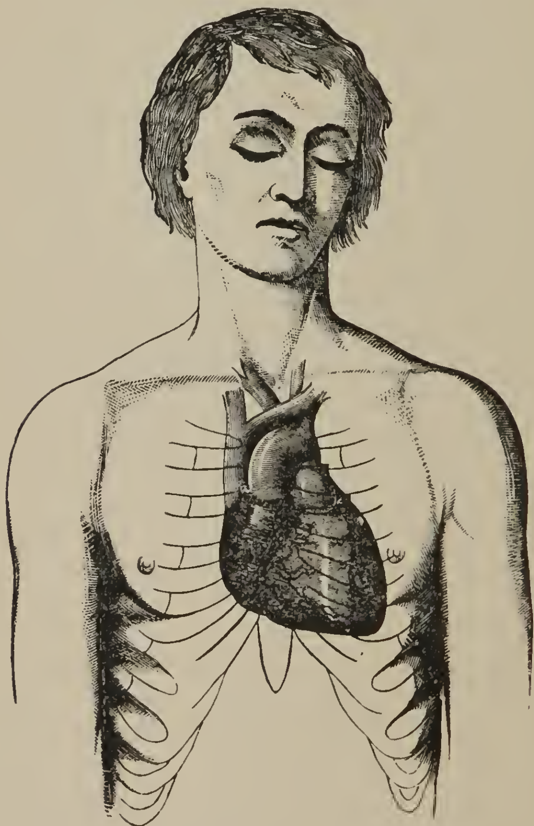
Towards *relieving* an attack which has come on, nothing is likely to

be better than a teaspoonful of *magnesia*, with half a teaspoonful of *aromatic spirit of ammonia*, mixed in a wineglassful of water.

One of the most likely things to bring on an attack of sick-headache is, waiting an hour or two beyond one's usual time for a meal, especially dinner.

Heart, Diseases of. *Palpitation* is not a disease, but a *disorder* of the heart; a good example of a *functional* disturbance, as distinguished

FIG. 223.



POSITION OF HEART IN A HEALTHY MAN.

from an *organic* disease. Palpitation is a violent beating of the heart, more or less distressing, according to its degree. It may be caused by strong coffee, very strong tea, tobacco, alcoholic drinks, sensual indulgence, or indigestion (dyspepsia). Even sedentary life, all the time indoors without exercise, promotes it, as one of the symptoms of nervous-

ness. *Avoidance* of all these causes is the substance of the treatment of simple Palpitation.

Inflammation of the heart affects chiefly either the inner or the outer membrane covering it. One form, therefore, is *Endocarditis*, and the other *Pericarditis*. In the former, injury to the valves is endangered. In the latter, effusion of serum may clog the heart's movements, or they may be obstructed by adhesion of the pericardium to the heart. Both forms of heart inflammation occur most often in connection with acute *inflammatory rheumatism*. In both, life is in danger during the attack, besides the after-effects above mentioned. The *symptoms* of both are much alike: pain and distress about the heart, with violence of its movement, hurried breathing, bad dreams, perhaps delirium, and fever. Only by auscultation and percussion, which require trained skill, can their respective signs be distinctly made out. In *treatment* of such serious affections, of course, medical aid should be called for. In its unavoidable absence, we can only encourage perfect rest in bed, with the shoulders moderately raised; simple, unstimulating, chiefly liquid, diet; at the beginning, a dozen or two leeches, if they can be had, over the region of the heart; if not, a mustard-plaster on the back, opposite to the heart; and, later, a small blister just below the situation of the heart's beat.

Valvular disease of the heart is, as already said, a frequent result of Endocarditis. It most frequently affects the valves of the left side of the heart—either the *mitral* or the *aortic* valves (see Anatomy). One or both of these may be distorted in shape, so as to keep the valve *imperfectly shut*, or *not sufficiently open*, in the alternate contractions and dilatations necessary to the circulation. "Physical examination," that is, in this case, auscultation, enables physicians to determine, almost with certainty, the exact conditions of these valves. The effects of such impediments to the heart's action on the circulation of the blood are serious, according to the *nature* of the valvular change in each case; to the *strength* of the heart to overcome the difficulty presented; and to the *amount* of *exercise*, labor, or excitement, by which the heart's action is increased. A marked difference between mere palpitation and organic disease of the heart is, that exercise lessens the tendency to palpitation, but makes worse the suffering from valvular obstruction.

In the case of Valvular Disease, however, neither medicine nor surgery can get at the heart to repair its injured mechanism. General care of the health, with avoidance of active exertion or much excitement, is all that can be advised or practised toward lengthening life. With such care, in a few instances, gradual restoration may take place; in many, the condition of the heart remains nearly the same, with tolerable

health, through months or even years. In many bad cases, and in more moderate ones where care is *not* taken (as sometimes seems inevitable in patients of the laboring class), the results of heart-disease go on to show themselves. These are, greater and greater distress with the heart's action and in breathing, often worst at night; and *dropsy*, of the feet first, afterwards of the abdomen and the body at large (anasarca). Weakness increases, and at last death closes the scene.

Enlargement of the heart may be either overgrowth (Hypertrophy) or stretching (Dilatation). Hypertrophy is a true thickening of the muscular walls. Sometimes it may result from habitually excessive exercise; as in violent gymnastics, rowing in races, running at cricket, etc. More frequently it is brought about by the natural effort of the heart to overcome the resistance to the movement of the blood caused by valvular obstruction in the heart itself. Like any other muscle, the heart grows with exercise—that is, if it is well nourished, and has intervals of rest. But if *not* these, then over-labor weakens it; and, when the obstruction is considerable, the heart is stretched, dilated; its walls at the same time becoming thinner (attenuated). This is Dilatation of the Heart. The "physical signs" of this, as well as of true Hypertrophy, are fully set forth in professional works. Besides dropsy and debility, gradually increasing, a special liability of sufferers with Dilatation of the Heart is to attacks of *congestion* of the *lungs*.

The *management* of both varieties of enlargement of the heart requires the same carefulness to avoid exertion and excitement as in the case of valvular disease. This is all that, in Home Medicine at least, can be well specified about it.

Fatty Degeneration of the heart has been spoken of in its own place. *Heart-exhaustion* has been met with in a number of cases, such as those observed by myself and others in our Army Hospitals during the Civil War. It was brought on, for example, during the disastrous "Peninsular Campaign" in Virginia, by the soldiers having to march a great deal at "double-quick" rate, with very little rest at night, poor food to eat, and bad water to drink. Although some of these men looked pretty well, and might be supposed to be able to do something, their pulses were feeble and easily hurried; and slight exertion would knock them up at once.

Heartburn. See **Dyspepsia.**

Heat-stroke. Usually called *Sun*-stroke. Better described under the former name, because many cases occur in the shade; some even (in India and China) at night. Nine-tenths of the examples of this are met with in large cities. Very few people are sunstruck on the harvest-field, or when running upon cricket grounds. What causes the differ-

ence? Clearly it must be the *atmosphere* of towns. Depression of the vital energy by foul air makes excessive heat take worse effect. Moreover, *intemperance* predisposes greatly to this kind of attack. Those who suffer Heat-stroke are nearly always fatigued when it comes on. To *avoid* it, the three things to do are: to live in the country during the summer if you can; never to drink any whisky, wine, or beer; and not to use severe exertion when the thermometer is over 90° in the shade.

Symptoms of Heat-stroke may be of either of two kinds, or of a mixed character. Perhaps the last are the most common. Extreme cases may be, 1. True *Sun-stroke,* or Heat Apoplexy; in which the head is chiefly affected, with congestion, from the direct effect of the rays of the sun; 2. *Heat-collapse,* with paleness and prostration, the patient being conscious even to the last. In both of these varieties, the pulse is generally rapid. In a few of the apoplectic kind it may be slow; in most of those it is full, until near the fatal end. Both are very dangerous to life.

What to do? Very plainly, *heat* is the *cause* of the attack, and *cold* gives its main hope of cure. If the face be red and the head hot, the pulse full, the breathing snoring, and the patient unconscious, lay him in the shade with his *head and shoulders raised,* and apply ice-water freely to his head. At the same time put large mustard-plasters to his legs. If, on the other hand, the face is pale, the body as warm as the head, the pulse weak and rapid, the patient conscious but fainting with debility, lay him *level* in the shade, the head no higher than the feet. Pour cold water over his head, trunk, and limbs (taking care, of course, not to do this *too* often, so as at last to chill him). Give, by the mouth, half a teaspoonful of aromatic spirits of ammonia, or, if sooner on hand, a teaspoonful of whisky or brandy, or a tablespoonful of wine; and repeat the same, if need be, in half an hour. All other treatment had better be left to the judgment of an attending physician.

Hemicrania. Pain on one side of the head. See **Headache** and **Neuralgia.**

Hemiplegia. Palsy of one half of the body. See **Paralysis.**

Hemorrhage. See what is said on this subject under **Remedies** (p. 544).

As to the *origin* and *nature* of Hemorrhages, they may be either, 1. Active; 2. Passive; 3. Traumatic (from injuries); 4. Symptomatic; 5. Critical; or 6. Vicarious. *Active* Hemorrhages are those preceded by an increased flow of blood towards the part. *Passive* are the result of weakness of the walls of the small blood-vessels, or too great thinness of the blood. *Traumatic* bleeding, from wounds or injuries, belongs to

the domain of Surgery. (See **Accidents** and **Injuries**; nearly the last portion of this book.) *Symptomatic* Hemorrhage occurs from the nose in the early stage of typhoid fever, and later from the bowels; from the lungs in consumption; from the stomach, as black vomit, in yellow fever. *Critical* Hemorrhage takes place sometimes in that and in some other fevers; just before convalescence. *Vicarious* bleeding is now and then met with, from the nose, stomach, or bowels, in women whose menstrual flow has been interrupted.

Medical authors give the name *epistaxis* to bleeding at the nose; *hæmoptysis* is spitting of blood; *hæmatemesis*, vomiting of blood; *hæmaturia*, passing of blood in the urine. For the *treatment* of Hemorrhages, see **Remedies** (p. 544).

Hemorrhoids. See **Piles.**

Hepatization. A term applied to the condition of an inflamed lung, in the middle stage of pneumonia; in which it is full of blood and lymph, making it red and firm to the touch, like the liver.

Hernia. See **Rupture.**

Herpes. Tetter; a watery eruptive affection. See **Skin Diseases.**

Hiccough (pronounced *Hiccup*). This, called *singultus* by physicians, is a sudden spasmodic motion of the diaphragm (see **Anatomy**), causing jerking breathing. It comes very often from slight indigestion, or from prolonged laughter or crying. In a person of ordinary health it is of no importance. Drinking a wineglassful of cold water, *slowly*, will generally stop it; at any rate, it will go off itself.

When the system is greatly prostrated by disease or injury, hiccough is a very bad sign. It does not make the patient worse, but it shows that he is sinking, nigh unto death. In such a condition, the only proper treatment is that adapted to the general state of exhaustion.

Hip-Disease. See **Coxalgia.**

Hodgkin's Disease. First described by Dr. Hodgkin, of England, this consists of a general morbid enlargement of the spleen and lymphatic glands, all over the body. It is now generally called *Pseudoleukæmia* in medical books, on account of the changes in the blood.

Hooping-Cough. *Pertussis*, in medical books. A disease generally affecting any one but once in a lifetime; contagious, also, although without any eruption on the surface of the body. Coming on rather gradually, like a bad cold with cough, the spells of coughing become more and more severe. In about a week, the child (or other patient) coughs so violently as to get red in the face, often sick at the stomach, especially after eating, and out of breath. At the end of a paroxysm of coughing the breath frequently, in inspiration, makes a whooping

sound; hence the name, whooping- or hooping-cough. But its subjects do not always whoop. The essential part of the disorder is the *paroxysmal* cough, continuing also for six, eight, or ten weeks. The patient may, particularly when in the open air, be for several hours without coughing; and then comes on a terrible spell, as though he might cough his breath away. As it goes on, considerable thick expectoration is brought up. Death does not often occur in the paroxysms, although they look very alarming. Feeble children are sometimes exhausted by the continuance of the disease. Now and then, in those predisposed to consumption, this may follow it.

Treatment of Hooping-cough must at first, as with any other cough, be directed to soften and loosen the cough; as by syrup of ipecacuanha. Later, the *spasmodic* (nervous) element has to be dealt with. *Assafœtida* is here suitable; for children, the milk of assafœtida, in teaspoonful doses; with syrup of squills as a simple expectorant. Among the other antispasmodics used in Hooping-cough by physicians, the best are *musk*, and the *fluid extract of hyoscyamus*. Of the latter, I have known two-drop doses, to a child ten or twelve years of age, very effective in lessening the violence of the spells of coughing. A warming-plaster on the chest, or in the worst cases even a small blister, will contribute to the cure.

While a child with Hooping-cough is not too ill to be moved, being often in the fresh air will be good for it, taking it out of doors every sunny day at least. If a case be much protracted, with wasting and weakness ensuing, *iron*, *cod-liver oil*, and *salt bathing* may be called for, to build up its strength.

Hydatids. Watery growths in different organs, caused by the presence of stationary parasites; *echinococci*. They may infest the liver, lungs, brain, or other parts. Little can be done for them, but they do not, as a rule, produce rapidly injurious effects, the patient often living for years after their formation. Sometimes relief is obtained by tapping the watery tumor and drawing the fluid off.

Hydrocephalus. Water in the head, literally; dropsy of the brain. Nearly always, this occurs in the first few years of life. Some children are born with it. The largest human head I ever saw was one in the Museum of the College of Surgeons in London; it was that of a child two years old, enormously enlarged from water slowly forming upon the brain while the sutures between the bones yielded, and the membranes and bones all grew larger to accommodate the increase of the distending fluid. Commonly, however, death takes place from pressure within a few weeks or months. No active treatment is likely to cure this affection, unless it be the *early* use of saline purgatives and diuret-

ies, according to the patient's strength. Carefully *tapping* one of the distended sutures may be thought of by a physician in a case lasting longer than usual.

Hydrophobia. A not well chosen common name for the effect sometimes following the bite of a mad dog or skunk. It occurs in about one-tenth of all those who are bitten by rabid animals. A very remarkable thing about it is the length of time after the bite before the symptoms occur. This is generally a month, sometimes two months, or possibly more. I doubt the genuineness of cases said to have happened a year after the bite.

Some people deny or doubt the existence of such a disease as hydrophobia. Even physicians who have never seen it have sometimes supposed that the cases must be examples either of hysterics or of tetanus (lock-jaw). But two cases which I saw (one under my own care, in a boy eight years old) left no doubt whatever that it is an entirely specific disease.

The characteristic *symptom* of Hydrophobia is, an irresistible spasmodic *gasping*, or sudden and forcible drawing in of the breath, whenever any strong impression is made on the patient's senses; as by attempting to drink, by a flash of light, or a loud sound; or even by the passing of a wave of cool air over the face. There is usually also delirium. In my patient's case this was angry, furious. He did not, however, bite nor bark. I believe they never do, unless in the *hysterical* cases, imitating hydrophobia, in persons frightened into the belief that they have it, after having been bitten. There is no *fear* of water; great thirst exists. But the patient cannot swallow liquids, because the effort to do so causes gasping and choking. Death always follows, in from three or four to eight or ten days. *If* ever a case of real Hydrophobia has been cured, it has been by use of the most powerful narcotics in heroic doses, as woorara (prepared in South America by Indians for poisoned arrows), chloroform, etc. I gave my little patient enough chloroform to breathe to have killed ten men, but it only mitigated the spasms from time to time. Certainly, however, his suffering was much lessened thereby.

Prevention of Hydrophobia requires two things. First, kill every dog as soon as he is reasonably suspected of being mad. Secondly, cut out or cauterize (burn out) the bitten part, whenever practicable, as soon as possible. If a hand is bitten, for example, at once tie a handkerchief tightly about the wrist, to check the flow of blood. Also suck the part promptly and strongly; spitting out the blood, of course. Next, let a surgeon amputate the bitten finger, or cut out the bitten flesh, or apply to it a red-hot wire, or a piece of caustic potash or lunar caustic (nitrate

of silver). Burning thoroughly will almost certainly answer without amputation. Pasteur has confidence in carbolic acid.

How shall one know when a dog is getting mad? He is at first sick, indeed ill; uneasy, restless, snapping at things in the air; out of his common habits and temper altogether. He may be still kind to his master; but this is not to be trusted. Whenever a dog barks or growls *hoarsely*, moves around *crazily*, and fights or snaps at imaginary enemies, muzzle him, tie him up, and watch him. He ceases to eat his natural food, swallowing dirt instead; and soon, if loose, will run aimlessly at large, biting at every living thing, large and small, in his way. But it is unmerciful to suppose a dog to be mad without good reason. If suspected, and chained up out of the reach of any one so as to do harm, he can be watched safely, and perhaps saved from an undeserved death. (See page 742.)

Hyperæsthesia. Excessive sensibility; shown by a very slight touch of a part giving pain. It shows a morbid state either of the *nerves at the surface*, or of the *nerve-centres* of sensation in the brain.

Hyperopia or **Hypermetropia.** An error of sight, the opposite of near-sightedness or *myopia*. In the latter, the image of an object falls short of the retina, unless the object is brought very near to the eye. In *Hyperopia*, the image falls behind the retina, except when the object is at a considerable distance. The far-sight or long-sightedness of old persons is in part of this nature; but Hypermetropia occurs not unfrequently also in young persons. It is corrected by *convex* glasses; *myopia*, the opposite, by *concave* glasses. (See page 405.)

Hypertrophy. Overgrowth. (See **Heart, Diseases** of.) A corn is a Hypertrophy of a part of the skin; and so, with some change, is a wart. It is not common for overgrowth of any organ to interfere seriously with the health; but it is considered possible for this to happen; the brain, for example, becoming too large for the skull. As a rule, the *soft* parts, as the brain, govern the growth of the *hard* parts in adaptation to them.

Hypochondria. Low spirits; despondency about one's own health. The derivation of the word is from two words in the Greek, meaning *under* the *cartilage;* that is, of the rib; referring to the *liver*. The ancients supposed dull spirits to proceed from disorder of the liver or of the spleen. Hence also *melancholy;* literally, *black bile*. See **Dyspepsia.**

Hysteria. A many-sided derangement of the nervous system, nearly, but not quite always, affecting women. *Young* women of anæmic habit (*i. e.*, with poverty of blood) are its most frequent subjects. Its symptoms show morbid excitability of the sensori-motor and emotional appa-

ratus; now in one way and then in another, even in the same case varying from time to time.

"Hysterics" are paroxysms of crying or laughter, or of various movements, beyond the patient's control. Sometimes real *convulsions* occur; imitating epileptic convulsions, but without loss of consciousness. Imitation of various diseases is common in those who have Hysteria; not only imitation, indeed, but functional disorders of a very positive kind, yet transient in duration. Such are *hysterical palsy*, *hystero-epilepsy*, hysterical *blindness*, and hysterical *hydrophobia*. Morbid men-

Fig. 224.

HYSTERO-EPILEPSY.

tal traits are often very remarkable; a strong craving for sympathy sometimes leading to pretended disorders.

In *treatment* of Hysteria, moral and hygienic management are generally as important as medicine. The patient must be instructed and influenced to exert self-control. Her general system also must be strengthened. *Iron* is apt to be needed, to improve the quality of the blood. *Salt-bathing*, *milk* for food, and *abundance of sleep*, are to be recommended. Light gymnastics, or active exercise in rowing, riding on horseback, etc., will do good, if kept within the limits of the patient's strength. To mitigate the nervous disturbance in hysterical *attacks*, assafœtida, valerian, and camphor are often serviceable.

Some physicians believe that (as its name indicates) disorders of the womb have much to do with Hysteria. Undoubtedly they sometimes produce or increase it; but they are not essential to it.

[**Hydrophobia** is asserted by Pasteur, of Paris, France, to be often prevented by inoculating the person bitten with a specially-modified matter taken from an animal which has had the disease. An institution for this treatment has been established in New York under Dr. Gibier (1890). It is not proved that it is a certain preventive; but, if *sure* that a bite was that of a *mad* dog, the desperate danger may justify, when practicable, so desperate a remedy as soon, if at all, as possible.]

Ichthyosis. Fish-skin disease. See **Skin Diseases.**

Icterus. See **Jaundice.**

Idiocy. See **Imbecility.**

Ileus. A painful attack, depending on some form of *obstruction of the bowels;* which see.

Imbecility. Feeble-mindedness; sometimes *congenital* (beginning at birth), when it is called *idiocy;* in other cases produced by disease or injury affecting the brain. It varies in degree very much; from mere dulness or natural stupidity down to absence of all intelligence or even affection. In some cases the moral nature seems to be the most involved; the child lacking attachment to its mother, brothers, or sisters. Often one or two of the mental powers may remain in considerable development. I have known an imbecile to have a real talent for mechanical construction, although he could hardly be taught to speak at all.

With an immense amount of patience and loving attention, almost every imbecile person can in time be so improved as not to be burdensome; many can even be made useful and self-supporting. This can be best accomplished in institutions established for the purpose; such as the Pennsylvania Training School for Feeble-minded Children, near Media, Pennsylvania.

Impetigo. A pustular eruption upon the skin. See **Skin Diseases.**

Incontinence of Urine. Much most frequently, this is a trouble of children at night. In adults it may be caused by a severe injury or disease of the spinal marrow; or, possibly, by disease of the bladder.

Cure of this difficulty in children is sometimes quite hard to obtain. Important directions about it are these: let the child drink but *little liquid* of any kind within two or three hours before going to bed. Be sure that it *empties the bladder* just before getting into bed; and that it does not then have the *feet cold.* If, notwithstanding these precautions, it still wets the bed, let some one take it up late in the night to relieve the bladder. Impressions upon the *mind,* of the nastiness and (not too heavily condemned) discredit of such a habit, will mostly assist much in the final cure of incontinence.

Infantile Paralysis. A form of palsy in children, not very uncommon, and more frequently recovered from than almost any other variety of paralysis. It comes on rather suddenly, with feverishness, and perhaps disorder of stomach; in bad cases, with convulsions. The lower limbs are chiefly affected, and the palsy is seldom complete; that is, some motion, although feeble, is possible, and sensation is not entirely lost. One important fact is, that, unless care be taken to prevent it, the helpless limbs will, from wrong positions, become *deformed.* Club-foot

is thus sometimes accounted for; which might, with attention, have been prevented.

Treatment of Infantile Paralysis requires warm rubbing of the spine and limbs; the warm or even hot salt-bath every day or two, drying the patient quickly afterwards; and sun-baths, or, at any rate, carrying the child frequently out into the sunshine and fresh air. Cod-liver oil is generally suitable; electricity is, as a rule (used with moderation and caution) beneficial; and physicians are likely to prescribe strychnia in very small doses, watching its effects. If, while a child is taking strychnia or nux vomica, it becomes very restless, inform the physician of the fact, and meanwhile withhold the medicine until he gives further advice.

Infantile Remittent. A name given by medical writers, down to near the present time, to a combination of symptoms, not very regular, which are now considered to be better otherwise classified. The term *gastric fever* was also similarly used. There is reason to believe that most of the severe cases are really *typhoid* fever; some, in malarious regions, genuine *remittent* fever; and those of short duration, *indigestion with feverish symptoms.* Under those heads, therefore, all that need be said in regard to treatment will be found.

Inflammation. See this heading under **Nature** of **Diseases**, in an earlier part of this volume (page 485).

Inflammations of the *different organs* of the body are also treated of, each under its own head, in this alphabetical succession.

Influenza. Epidemic catarrh. This appears to be a real epidemic, not dependent on bad weather or individual exposure; but, at certain times, like the *epizootic* of horses, passing over the whole country and affecting almost everybody, old and young. Its *symptoms* are those of a "bad cold all over"; with rather more headache, pain in the back, disturbance of the stomach, fever, and weakness, than in ordinary bad colds. Old people, and very feeble younger persons, may die of Influenza; with others it can seldom be said to be a dangerous illness.

Treatment of this affection does not need to differ from that of a severe general "cold," except that it bears better and gains more from the use of *quinine.* If, when the first symptoms commence, two- or three-grain doses of quinine are begun with, repeated within two or three hours until eight or ten grains are taken within twelve hours, the attack may often be aborted or averted. If not, there will be no advantage in taking more than six grains of quinine afterwards, distributed through the day.

Other measures, if an attack be actually developed, are, a brisk dose of a *saline cathartic,* as citrate of magnesium, Rochelle, or (if one don't

mind a nasty dose) Epsom salts; flaxseed lemonade as a frequent drink; a warm or hot mustard foot-bath at night. Of course the patient must keep warm, in one room; if ill, in bed. Allusion may be here made to other ways often used to abort a cold or an attack of Influenza. Some try to do it by taking a hot alcoholic drink (egg-nogg, whisky-punch, etc.) on going to bed. Others, by a ten-grain dose of Dover's powder (containing a grain of opium) at bedtime. Such measures do succeed, in a certain number of cases, in producing free perspiration, and warding off an expected attack. But if they do *not* succeed, they make things worse; more headache, hotter fever, and greater weakness following. It is a "kill or cure" kind of practice; an objection which does not apply to the use of quinine in the way above mentioned.

In-growing Nail. See **Nail, In-growing.**

Insanity. Derangement of the mind. **Idiocy** is deficiency of mental capacity, from birth; **Imbecility,** such deficiency whether the person was born with it or has lost his faculties from disease or injury.

Insanity is understood to depend upon *disorder* of the *brain,* the instrument of mind. If any examples of it occur from purely mental "entanglement," the brain being sound, they must be very few; and such are not recognized as possible by most authorities on the subject.

Varieties of Insanity are: 1. *Mania.* 2. *Melancholia.* 3. *Dementia. Mania* is divided into *General* Mania and *Monomania;* in the latter, the patient being deranged chiefly on one subject only; also, into *acute* and *chronic* Mania, according to its duration. Either the intellectual or the emotional powers may be predominantly involved; when the latter are most so, it is often called *moral* (emotional or *impulsive* would be better) Insanity.

Melancholy is characterized by gloomy and desponding thoughts and feelings, which occupy the whole mind for the time. It is less often cured than acute mania; but recoveries from it do occur.

Dementia is the total wreck of the mental capacities. Its subjects are more helpless than any other human beings except infants in arms. From it, recovery is never to be expected.

Treatment of Insanity requires the skill of those devoted especially to it. Experience shows that, since the immense improvement in the hospitals and asylums for the insane, which dates from about the beginning of this century, almost every insane patient has the best possible chance of cure when he is taken early to such an institution. There he will be secure from danger of injuring himself or others; and will have, besides skilful medical treatment, every surrounding circumstance to promote the healing of his perturbed mind. Comfortable rooms, beautiful grounds, books, musical instruments, evening entertainments,

tranquillizing religious services; and, latterly, in many such places, opportunity for work; all these are abundantly furnished in the best modern retreats, as they might be called, which are fitted out as hospitals for the insane. There, nearly or quite half of those entering with first attacks are cured, within from three to six months; and of those not cured, the condition is so much more tolerable than elsewhere, that a visit to such a place may give rise to the question, whether anywhere else in the world there is a larger proportion of enjoyment to suffering, than within the domain of a well-constructed and well-managed hospital for the insane.

It is true that in a certain small number of cases of patients who are not inclined to violence, and who are only partially deranged, treatment at their own homes, or at least in private houses, may answer well; and may even be better than to disturb their feelings by taking them to an institution. But these are exceptions, and ought always to be judged of by a physician who is well acquainted with insanity.

Insolation. See **Heat-stroke.**

Insomnia. Sleeplessness. Much has been said of this under **Hygiene** (Mental Hygiene). It may be brought on by alcoholic *intemperance,* excessive use of strong *coffee or tea,* or *brain-strain* by worry or overwork. In every case, the first thing in its *treatment* must be the removal of the *cause.* Without this, a cure cannot be expected.

When the cause is removed, sleep may be promoted in several ways; whose success will depend chiefly upon the nature of each case. All of them may be tried when necessary. Such are, a warm bath just before bedtime; lying with the head and shoulders moderately raised; avoiding study for an hour or two before the usual hour for retiring; dumb-bell exercise for twenty minutes just before getting into bed; rubbing all over near bedtime (see **Massage,** under **Nursing,** page 647).

Medicines for Insomnia need to be used with much judgment, or they may do harm instead of good. Such is the case especially with ale, wine, etc.; as well as with bromide of potassium or sodium, chloral, and all kinds of opiates. These cannot be recommended to be taken or given without competent professional advice.

Intercostal Rheumatism. Rheumatic pain and soreness *between the ribs.* It is sometimes troublesome and tedious; but, by itself, not dangerous. Warming applications, of any convenient kind, constitute the substance of its particular treatment.

At the very beginning, direct heat is often the best thing; for instance, a flat-iron, as hot as can be borne, laid upon or passed over the part repeatedly. A flesh-brush, or a common hair- or clothes-brush, may rub out a considerable pain, in some cases. A mustard-plaster is always

safe and likely to do good; later, a Burgundy pitch or Allcock's porous plaster, to remain on for a week or two, for continued relief and protection of the part from cold. One who is liable to Intercostal Rheumatism should wear flannel, silk, or thick merino next the skin all winter, and *thin* flannel all the year round, for security against weather changes.

Intermittent Fever. See **Ague.**

Intestinal Obstruction. See **Obstruction** of the **Bowels.**

Intussusception. Stove-pipe-like inclusion of one part of an intestine in another portion, above or below it. See **Obstruction** of the **Bowels.**

Iritis. Inflammation of the *iris*, the circular arrangement of muscular fibres around the pupil of the eye. It is recognized by the occurrence of irregularity in the form of the pupil, from adhesions of the iris when inflamed. In order to prevent these from permanently narrowing the pupil, it is usual to drop into the eye a (two to four grains to the fluidounce of water) solution of *atropia*, every day or two. See **Eye, Diseases** of.

Itch. See **Skin Diseases.**

Jail Fever. See **Typhus Fever.**

Jaundice. Yellowness of the skin, from biliary coloring matter deposited in it. This must result from either, 1, the liver *not removing* the coloring matter from the blood, and its finding its way out through the small blood-vessels over the body; or 2, the bile being secreted from the blood by the liver, but being then *reabsorbed* into the blood from the gall-bladder, on account of *obstruction* of the gall-duct by gall-stones.

There is no *special* remedy for Jaundice. The treatment of those having it must be addressed to its cause, so far as made out; and to the general condition of the system at the time. In a recent case, calomel or blue pill, taraxacum and nitromuriatic acid, are usual remedies.

Kidneys, Diseases of. *Pain* in the Kidneys is felt in the back, on each side of the spine, about three inches below the edges of the ribs. *Congestion* of the Kidneys may be produced by cold and wet. It is attended by pain, with scanty, high-colored urine. *Inflammation* of the Kidneys (*nephritis*) is yet more painful; with bloody urine in some cases, and other changes in that fluid, discovered with the aid of the microscope. *Bright's Disease* is a more prolonged affection, with albuminous urine, and changes in the structure of the Kidneys. (See **Bright's Disease.**)

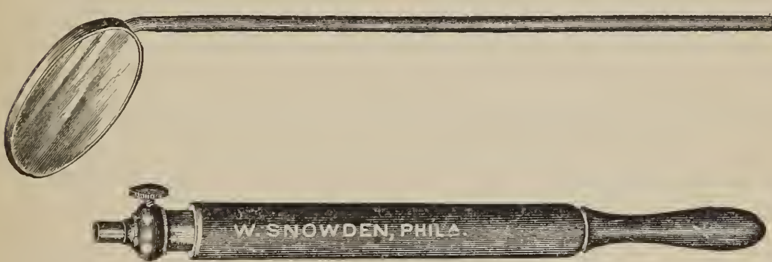
Congestion or commencing inflammation of the Kidneys may be advantageously treated by the application of *cups;* dry in a feeble person, cut so as to draw blood in a patient of tolerable strength. If this be not done, a *large mustard-plaster* should be applied to the small of the back. Placing the feet in hot mustard water will be suitable; and so will be the free drinking of *flaxseed-tea;* sweetened to taste, but without lemon-juice. It is desirable in such cases to promote the free action of the skin to relieve the kidneys. When pain is very considerable, Dover's powder at night will be appropriate, to favor sleep and perspiration. Other treatment would better be left to a physician.

Larynx, Diseases of. Inflammation of the Larynx (upper windpipe; see **Anatomy**) is called by physicians *Laryngitis.* The most common form of *acute* Laryngitis is **Croup**; which see. *Chronic* Laryngitis is a slow affection, always giving time for treatment by a physician. For its further consideration, therefore, the reader is referred to technical medical books. (See Fig. 225.)

Lepra; Leprosy. For these (which, as the terms are used, are not the same), see **Skin Diseases.**

Leucocythæmia; Leukæmia. Both of these names refer to the same disease. It is characterized by the presence of an excessive proportion of *white* (colorless) *corpuscles in the blood.* Symptoms of it are: debility, swelling of the abdomen, general dropsy, often vomiting or diarrhœa, jaundice, and bleeding from the nose or gums. The liver, spleen, and lymphatic glands are often enlarged in various degrees. Tenderness to the touch of some of the bones exists in some cases; a chronic

Fig. 225.



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cough in others. The only *certain* recognition of it is obtained by examining blood taken from the patient with a microscope. Then the number of the white corpuscles (*leucocytes*) is found to be, not, as in health, one to fifty or a hundred of the red corpuscles, but one to six, four, or three of the latter.

There is no reasonable expectation of recovery from well-marked Leucocythæmia; but the patient may live with it for several years. Medicine can do very little for it; general hygienic management is very important towards prolonging life.

Leucorrhœa. In popular language, "the whites." A feminine disorder, consisting of a mucous vaginal discharge; coming either from the uterus or from lower down. It results from irritation, followed by relaxation of the parts. *Prolapsus* (falling of the womb) is a very common cause of it. Even without that, it is often quite *chronic.*

Treatment may be needed with *iron* or *cod-liver oil* internally, to "tone

up" the general system. *Tincture of the chloride* of iron will be the best preparation, or *ammonio-ferric alum;* the latter best when the discharge is profuse; as that medicine is *astringent. Local* applications are important, used either as *suppositories* or by means of a *vaginal syringe* as injections. A suppository for this purpose may be made by mixing ten grains of *tannin* with enough *cacao butter* to make a mass for the vagina. For washes, used by injection, *oak-bark tea, lime-water,* and *solution of alum* (a drachm to the pint of water) may be mentioned as available. Some practitioners advise simple *hot water* (110° to 120° Fahr.) as the best.

Leukæmia. See **Leucocythæmia.**

Lice. See **Parasites.**

Lichen. A pimply (papular) eruption. See **Skin Diseases.**

Lithiasis. A disposition in the constitution to the formation of an excess of lithic or uric acid; shown sometimes in gout or gravel, in other cases by neuralgic or other manifestations of the action of uric acid in the blood.

Liver, Diseases of. This organ is frequently the seat of **congestion**; produced by "catching cold," by errors of diet causing indigestion, or by the chill of intermittent fever. Its symptoms are: pain under the lower ribs on the right side and under the right shoulder-blade; constipation, with lead-colored passages; a furred tongue, bitter taste in the mouth, sickness of the stomach, dizziness or headache, and yellowness (which may be slight) of the eyes and skin.

Treatment of this condition requires a simple, not fatty, diet, and medicine to act moderately on the bowels, and, if possible, to increase the flow of bile from the liver. Much experience has shown that *blue mass* or *calomel,* in small doses, will help to relieve liver-torpor. I advise, therefore, two grains of blue pill at bedtime, followed in the morning by a teaspoonful of *magnesia;* or, if constipation has been great, and the system feverish, a dose of *citrate of magnesium* or *Rochelle salts.* Should the "biliousness" not be entirely relieved, a grain of blue pill may be taken night and morning for a day or two more.

Chronic Congestion of the Liver has some of the same symptoms continued, in varying degree, for weeks or months; pain in the side and under the shoulder-blade, indigestion, a bad taste in the mouth, constipation, and more or less yellowness of the eyes and skin. It will not do to go on taking blue pill, even for a week at a time. We may follow it with *nitromuriatic acid,* three drops twice daily, in water (in a glass; do not put a *silver spoon* into it, as it acts upon silver). This may be continued, if need be, for weeks together. *Dandelion* root-tea, or *extract* of dandelion (*taraxacum*) is a favorite medicine for this trou-

ble with many who have tried it. Of the extract, ten grains may be taken once or twice daily. *Chloride of ammonium* (*muriate of ammonia* of the old chemical system), in five-grain doses, twice a day, will be likely to assist in improving the action of the liver.

The Liver is also subject to acute **inflammation** (*hepatitis*). This may occur as part of an attack in which also the stomach and small intestine are involved; called a "bilious attack" in common language; by physicians, "gastro-hepatic catarrh." But liver-inflammation also comes sometimes alone. It may follow acute congestion. The symptoms are the same as those of the latter, only the pain is more constant and severe, and there is tenderness on pressure on the right side, along the edge of the ribs. *Vomiting* also may be present, from sympathetic affection of the stomach; and diarrhœa, caused by the irritant quality of the bile. *Fever* attends in severe cases. **Abscess** of the Liver may follow acute inflammation. Sometimes the symptoms of the latter (inflammation) are quite obscure, and the existence of the abscess is first made known by some of its consequences. There is danger connected with liver-abscess, because the *pus* formed in it may escape into either the *chest*, through the diaphragm, or into the *peritoneal* cavity of the abdomen. In the latter case, collapse and death will result. If it enter the chest, it *may* pass into the lung and be coughed away. If not, an *empyema* remains (which see). Best, of course, and most frequent, is the opening of the abscess either into the bowels or through the skin, with the external discharge of the matter contained. By using the *aspirator*, with a fine hollow needle, physicians can, in case of suspected abscess, examine whether pus be present or not; and when this is made certain, it may be let out by means of a careful puncture or incision. Such treatment requires much skill and judgment in the practitioner. The early treatment of acute Inflammation of the Liver is nearly the same as that of acute Congestion. Cut cups, however, or leeches, may be one of the first measures used; and afterwards a blister upon the right side. Blue pill had better be given in smaller doses than in cases of congestion; half a grain three times a day for three days will be enough.

Cirrhosis of the Liver has been considered already under the heading, **Cirrhosis**. For other affections of the Liver, as *cancer*, *fatty* and *waxy degenerations*, *yellow atrophy*, etc., the reader must be referred to professional works.

Lock-jaw. See **Tetanus**.

Locomotor Ataxy. A slowly progressive disease of the nervous system, centring in the spinal marrow. Its most marked symptom, which has given the disorder its name, is a loss of control over the legs in walking. This is shown in a kicking or jerking way of stepping

out; very different from the dragging walk of simple palsy (paraplegia). If the patient shuts his eyes while standing, he will fall, the ordinary guidance by the sensibility of his feet being lost. Another curious symptom is the absence of the *tendon-reflex* movement of the legs. That is, when one leg is crossed over the other, and a smart blow is made with the hand just below the knee, the leg does not jump, as it does in a healthy state of the nerves and nerve-centres. Severe darting pains also, chiefly in the legs, belong to this disease. Gradually, perhaps after a number of years, the patient weakens, with increasing loss of muscular control, until death.

There is no cure for Locomotor Ataxy. Medicine has been so far shown to have only palliative, if any, effect. As with all slow chronic diseases, care of the general health may do much to prolong life and lessen suffering.

Lumbago. A painful affection of the small of the back, generally met with in elderly people. The same name is given commonly to two different kinds of attack. One is *muscular;* a form of rheumatism. This may come on very suddenly, making it impossible for the patient to rise and walk, almost to move at all. Keeping very still, and having warming applications made to the part (mustard-plasters; or spirits of turpentine and sweet oil, or, with tougher skins, pure oil of turpentine; or painting with tincture of iodine) will generally bring on recovery in a few days. Some old people, however, have frequent attacks. Such should always wear flannel, and be careful to avoid having wet feet or sitting in draughts. The other kind of Lumbago is *neuralgic.* See **Neuralgia.**

Lungs, Diseases of. *Inflammation* of the Lung is *pneumonia;* pulmonary *consumption* is *phthisis.* For the purposes of this work, a sufficient account of these diseases is given under the two headings, **Pneumonia** and **Consumption.**

Lupus. A creeping, eating disease of the skin, hard to cure. Dr. Koch, of Berlin, Germany, in 1890 claimed to be able to cure it with "tuberculin," which he made by dissolving tuberculous matter in glycerin. The difficulty of making and preserving such matter is much in the way of its use, even by skilful surgeons.

Malarial Fever. The three varieties of this, all produced by the same causation, are *Intermittent, Remittent,* and *Pernicious* Fever. See, for the first and last of these, **Ague**; for the second, **Remittent Fever.**

Mania. See **Insanity.**

Mania-a-Potu. See **Delirium Tremens.**

Measles. One of the **Exanthemata** (which see), or eruptive febrile diseases. It is contagious; and usually occurs but once in a lifetime. To this general rule, however, there are many exceptions.

Symptoms. First, the eyes become red, the nose runs, and the patient begins to cough. His head aches, and he feels badly all over. One would suppose he had a very bad cold. On the fourth day of this, however (possibly a day or two later), a red, small-pimply, blotched or patched eruption breaks out on the face, neck, breast, arms, abdomen, and legs. It is not of so bright a red color as scarlet fever, nor so hot and swollen; nor so continuous over the body and limbs. There is fever, and perhaps sick stomach or moderate diarrhœa; in young children sometimes convulsions. The attack passes its height usually in about a week; often in even less time. Few patients die of measles, except under unfavorable local conditions (as in camps during war), when epidemics of malignant (black) measles occasionally break out and are quite fatal. On convalescence, *weak eyes* are often left behind, or a *chronic cough;* endangering consumption in those predisposed to it.

Treatment of Measles is simple. Nursing is the main thing, to conduct the patient safely through it. If the bowels are bound at the start, I would give a moderate dose of a saline purgative (citrate of magnesium, Rochelle salts, or magnesia); moderate, because of the possibility of diarrhœa coming on in the course of the attack. Yet I believe the greater danger attends constipation, in all such diseases. The blood, in them, needs purification; and purgation of the bowels promotes this by carrying off waste matter freely from the body.

The cough may be treated with small doses of syrup of ipecac., and, later, syrup of squills; also flaxseed lemonade; perhaps even a small blister on the upper part of the breast in severe cases. There is no specific remedy for any of the "exanthemata." Much care must be taken on first going out after recovery. The air-tubes and lungs will be very sensitive at such a time, and exposure to cold and wet must be avoided for several weeks. A warming-plaster on the breast will be a good protection.

Hardly any disease is more *contagious* (catching) than Measles. Therefore, children who have not had it should be carefully kept away from any one sick with it; in another house, if possible. The disease

may be taken by another just before the rash is out; and also for a week or more after recovery has taken place. *Forty days*, from the beginning of the attack, is the period of absence from school prescribed by some authorities on the subject. Thirty days, in the case of Measles, appear to me to be enough. Danger to life is much less from this disease than from scarlet fever; and, as hardly any one is likely always to escape from it, a healthy child over five years of age may about as well have it at one time as another. A third person, as a physician or a nurse, going right from the chamber of a patient having Measles, may *possibly* give it to another liable to it; but such things seldom happen; especially when considerable time and distance intervene between their visits.

German Measles appears to be a sort of *hybrid* or cross between Measles and Scarlet Fever. It has a rash which is redder (deeper red) than that of Measles, and more in patches than that of scarlet fever. There is also more decided sore throat, and less prominent cough, than in Measles. It is less dangerous than scarlet fever, and not so contagious as Measles. It requires no peculiarity of treatment; only good nursing to steer the patient through it. Some call it *French* measles.

Megrim, *migraine; hemicrania.* See **Neuralgia.**

Melancholy. See **Insanity.**

Membranous Croup. See **Croup.**

Menière's Disease. See **Ear, Diseases** of.

Meningitis. See **Brain,** Inflammation of; also **Cerebro-Spinal Meningitis.**

Menorrhagia. Excessive menstrual flow. This may be either its too frequent occurrence, or too great an amount of discharge; but both often occur together. Causes of this trouble are: general relaxation of the system; over-excitement; thinness of the blood; and over-fatigue, especially long standing, or walking too far. Hemorrhage from the womb, not menstrual (*metrorrhagia*), may be due to *ulcer, cancer*, or other *tumor* of the womb; or, during pregnancy, *miscarriage* (abortion), or *misplacement* of the *after-birth* (*placenta prævia*). (See **Miscarriage.**)

Treatment of Menorrhagia must depend on the general condition of the patient. Most of those so affected are thin-blooded, *i. e., anæmic.* For these, iron is called for; the tincture of the chloride, taken thrice daily in fifteen-drop doses, for several weeks at a time. If *headache* follows the use of the iron, leave it off for a few days, and then try it in smaller doses. It does not agree with all.

Near the expected time, or at once if it occur sooner than expected, the patient must lie down, and remain at rest till it is over. If *very profuse*, fluid extract of *ergot*, half a teaspoonful every hour or two,

may be taken. Not often will this be needed if the patient keeps quiet. For really exhausting uterine hemorrhage, local measures are needed, as squeezing half a lemon in the vagina; injecting, with a vaginal syringe, hot vinegar and water (110° to 120° Fahr.). As a last resort, *plugging* must be used. This is Dr. T. Gaillard Thomas' plan: Pieces of cotton soaked in water, pressed and flattened out by the fingers, each about the size of a very small biscuit, may be pushed into the cavity of the vagina, until it is entirely filled. When, however, there is no time to spare, wads of dry cotton may be pressed in for the same purpose. We need hardly repeat that such a procedure is only appropriate for an extraordinary hemorrhage, by which the patient is evidently being weakened at the time.

Menstruation, Errors of. These are, **Amenorrhœa,** suppression of the monthly change; **Dysmenorrhœa,** painful menstruation; and **Menorrhagia,** excessive discharge, either in amount or frequency. See these three headings, respectively.

Methomania. Also called *Oinomania* and *Dipsomania.* A morbid and uncontrollable craving for intoxicating drink, the result of continued intemperance. The only hope of its cure, short of a miracle, is to be obtained by its subject being kept in a retreat where he cannot get liquor, for at least from three to six months. A year would be much better. All temptation to indulge being out of his reach, in time the morbid appetite will pass away; so that, if he will, he may avoid a return of his bad habit. It is necessary for such a one, however, always to abstain from everything alcoholic. Wine tasted at the "communion table" has, in a number of instances, caused the downfall of reformed inebriates. Institutions for the treatment of this terrible penalty of excess are now maintained in several places in this country; the Franklin Reformatory Home in Philadelphia is one of such, where about one-third of all entering are restored.

Milk Crust. An infantile eruption, occurring during dentition. See **Skin Diseases.**

Milk Leg. *Phlegmasia Dolens.* This has nothing to do with the milk, as was once imagined, although it is an affection of mothers after childbirth. We may quote, in its description, Dr. Dunglison:

"It occurs, for the most part, in the second or third week after delivery: it is limited to the lower extremity, and chiefly to one side, exhibiting to the touch a feeling of numerous irregular prominences under the skin. It is hot, white, and unyielding, and is accompanied, sooner or later, with febrile excitement. After a few days the heat, hardness, and sensibility diminish, and the limb remains œdematous for a longer or shorter period. The disease frequently, if not generally,

consists in the obstruction of one or more of the large veins. Owing to the presence of the gravid uterus, the flow of blood being obstructed, the liquid part of it is thrown out into the cellular membrane of the limb. Sometimes the vein is found completely obliterated."

In the *treatment* of this disorder, besides perfect quiet in bed, cooling washes or ointments are suitable. Very gently bathing with *sweet oil saturated with camphor* will do, for cases in which there is moderate heat and not very great tenderness to the touch. If the inflammation is very intense and hot, painting it (with a camel's-hair pencil) frequently with *lead-water*, to which a little laudanum has been added, will be the best plan for a day or two; afterwards, bathing as above, or applying oxide of zinc ointment. When the inflammation has subsided, *bandaging*, from the ankle and foot upwards, will aid in taking down the swelling.

Miscarriage. *Abortion;* premature delivery, too early for the child to survive. Those born at eight months often live; even seven-months' children have been known to do so, though seldom. Abortion is most likely to take place during the first six months.

Causes of miscarriage are: acute attacks of disease in the mother, or predisposition from weakness or chronic disease, such as constitutional syphilis; accidents, such as falls or blows; mental excitement, by fright, anger, or sudden joy; over-fatigue; and certain drugs, as ergot, savin, etc. Sometimes disease of the fœtus (infant in the womb) itself produces its death, and consequent abortion.

Symptoms threatening this casualty are: a general feeling of uneasiness, pain in the back, and afterwards also in the abdomen, coming and going like lesser labor pains; and a vaginal discharge, first mucous and then bloody. If, however, the miscarriage occurs during the first three months, there may be very slight symptoms besides the flooding which brings away the fœtus. This (the fœtus), of course, is very small during the early months.

When abortion is threatened, the patient must lie down and remain very quiet. If pregnancy has advanced beyond the fourth month, and pain is considerable, let an injection of laudanum (forty drops) with starch into the bowels be made with a small syringe, with a view to tranquillize the womb. But always a physician should be summoned as soon as the threatening symptoms appear. If it become plain that the thing is going on, and the fœtus will come away, the practitioner will find it necessary in some cases to hasten it, so as to get through with the least hemorrhage. In spontaneous abortion, this (the flooding) is the only danger. When criminal abortion is produced by instruments (the only certain way of bringing it on), there are other dangers also; the

womb may be injured, and *inflammation* of it or of the *peritoneum* (peritonitis) may take place and be fatal.

Here is the place to say that the intentional causation of abortion is always a crime, akin to murder. The child is a living human being, with a right to continued existence, from the moment of conception. One circumstance only can rightly qualify this; the certainty, determined by competent physicians (and in such a case there should be consultation) that, from deformity or disease in the mother, the child *cannot be born alive*, and the unsuccessful labor will endanger the mother's life.

It is wonderful what lax and false ideas about this matter some generally well meaning people have. I have known intelligent married people to ask advice as to how a commencing pregnancy may be cut short, simply because it interfered with their convenience in taking a journey. Yet the same persons would not think of quietly choking the baby, once born, because it was troublesome. Morally, there is not much difference. To every married couple, parentage is a blessing; the family is divinely ordained, as the natural and needful complex unit of society. Let no one, in selfishness or folly, commit the fault of disturbing this in its living development, by an act which has the double quality of petty murder and of domestic suicide.

Moles. These are either *marks* of dark color, on the face, neck, or body, or *swellings of the small superficial blood-vessels.* Neither can be removed without an operation; which must be left to the judgment of a physician or surgeon.

Monomania. Mental derangement on one subject. See **Insanity.** *Homicidal* and *suicidal* propensities, not controllable by the will, are examples. The latter may be hereditary, through several generations. A very annoying form is *kleptomania;* a morbid disposition to steal; sometimes met with in people too rich to have any ordinary temptation towards stealing. *Pyromania* is an insane desire to set fire to buildings.

All these may be easily confounded with real wickedness, prompting criminal acts. Ingenious lawyers often avail themselves of the "plea of insanity" to shield guilty clients. It ought to be held that the presumption always is that a person is sane unless clearly proven to be otherwise; and also, that *partially insane persons are often responsible* for their actions. The only exemption from legal penalties should be when it is shown that the disease of the mind present *took away the control of the will*, so that the person could not act otherwise, and so was not accountable. Moreover, the proof of insanity should be followed by the confinement of the insane criminal, for the security of the community. Such a person is not safe to be at liberty. Any one commit-

ting homicide, and acquitted on trial because of insanity, should (as is the law in England) be thereafter *detained in a secure asylum for the rest of his life;* with no chance or power of pardon or release. This would effectually meet the difficulties now existing in such matters.

Mother's Marks. See **Moles.**

Mouth, Diseases of. Leaving to Dentists the care of the Teeth, except in regard to **Toothache** (which see), we may speak of *Sore Mouth* as of several varieties. These are, 1. Simple inflammation. 2. Aphthæ. 3. Thrush. 4. Ulcer. 5. Gangrene. 6. Salivation. 7. Nurses' sore mouth. 8. Scurvy.

Simple inflammation of the mouth may come from anything corrosive, as creasote, sulphuric acid, etc. Both of these substances whiten the surface by their action, but cause swelling, pain, and tenderness. Either, if swallowed in even very moderate quantity, will poison, fatally. (See **Poisons.**) *Treatment* of such an inflammation requires cooling and soothing. Ice, gum-arabic water, flaxseed-tea, glycerin (diluted half and half with water), and almond-oil, are here available. Later, borax-water, alum-water (followed by pure water, lest it act upon the teeth), and water made yellowish and milky by the addition of tincture of myrrh, will do good.

Aphthæ have been already considered. See **Aphthæ.**

Thrush begins with simple inflammation of the mouth (nearly always of an infant), and, after a day or two, a number of small whitish points, which come together, forming a curd-like appearance. These may fall off and be renewed. In bad cases they become brownish in hue. The child's mouth is hot, and sickness of stomach, perhaps with fever, is common. The attack may last from one to two or three weeks. It is never fatal, unless in a child otherwise very much run down.

Chlorate of potassium is the usual medicine relied upon in this affection. From three to five grains three or four times daily may be given in powder to an infant under four years of age. Magnesia will be a suitable laxative for the bowels. Feeble infants may also require quinine as a tonic, in half-grain or quarter-grain doses; some of them, stimulation, by adding a few drops of whisky to a portion of their milk. *To the mouth* we may apply at first gum-arabic water; then glycerin and rose-water (one part to four or five); borax in solution (two drachms in four ounces), or borax in powder, equal parts with sugar; later, tincture of myrrh in water (half a teaspoonful in a wineglassful), or alum-water. All of these may, indeed, be used in succession, if the case be obstinate. The best way to make any application to an infant's mouth is by means of a camel's-hair pencil; a fine sponge or clean soft rag may do, though not so well.

Ulcer of the mouth is often called *canker* (cancrum oris). It begins on the cheeks, gums, or lining of the lips; but it may reach as far as the entrance to the throat (fauces). The ulcer is grayish or yellowish-white, with a red inflamed margin; the cheek often swells with it. It is usually painful; the breath is very heavy, and fever may be present. This complaint may last for several weeks, even months; but it is almost never fatal. It is most common in children from two to six years of age, but may attack adults.

Treatment of canker or ulcer of the mouth must be adapted, first, to the general condition of the patient. If this is low, tonics may be required; as quinine, iron, cod-liver oil. Sometimes the use of an acid medicine, as aromatic sulphuric acid, will have an immediately good effect. Chlorate of potassium may be given—five grains or less for an infant; twenty grains, several times a day, for an adult. Keeping the bowels regularly open is important.

To the *mouth*, the same applications as are mentioned above for *thrush* will be appropriate here also. Besides, it will be safe and well to touch each ulcer once or twice a day with a crystal of *bluestone* (sulphate of copper); or, very lightly, with a stick of *lunar caustic* (nitrate of silver). Between the times of other applications (above-mentioned) let the finger or a small camel's-hair pencil smear each ulcer frequently with a powder of equal parts of *prepared chalk and gum-arabic* well ground up together; or a paste, of prepared chalk moistened with glycerin.

Gangrene of the mouth is rare, but serious and dangerous. A bad state of the general health predisposes to it. It is mostly seen in children, in almshouses, etc. Beginning as an ulcer, ash-colored, on the gums or inside the cheek, the parts swell, and in time slough or mortify; becoming dark and offensive in odor. The cheek is "eaten through;" other ulcerations form, an acrid fluid is discharged, the teeth may fall out. Low fever and prostration attend, with diarrhœa, cold perspirations, and finally death. The only hope in this disease is in arresting it early.

In *treatment*, quinine and tincture of chloride of iron are needed from the first, with milk diet, beef-tea, and wine whey or whisky punch carefully proportioned and administered. Ten or fifteen drops of whisky every two or three hours will be enough to give to any infant. To the *mouth*, at the beginning, the applications above mentioned for *ulcer* will be suitable, with extreme care to keep the mouth clean all the time. A very soft sponge wet with *lime-water* will be good to swab it out with now and then. (A sponge so used must be well scalded to be fit for use more than once.) When *mortification* has begun, a solution of *chlorinated soda* (a teaspoonful in a wineglassful of *glycerin*) may be applied.

If obstinate, other local remedies are, solution of *creasote* in glycerin or in water (from three to twenty drops in half a wineglassful); *permanganate of potassium* (ten grains in a fluidounce of water); *chloride of zinc* (one grain in a fluidounce of water). Any of these can be best applied with a camel's-hair pencil to the parts.

Salivation, from large doses of calomel or blue mass, was once a frequent affection. Nowadays, physicians do not salivate their patients. If any of them, by some accident, should do so, he will be at hand to direct the treatment; so we may leave it to him. It needs only to be said, that the signs of mercurial sore mouth, or salivation, are—a copious flow of saliva, a metallic taste in the mouth, swelling and soreness of the gums, and tenderness of the teeth when pressed together. Formerly, bad salivation would now and then cause some of the teeth to fall out. "Nous avons changé tout cela." We never do so any more.

Nurses' Sore Mouth is, as its name shows, an affection of those who are suckling infants. Sometimes it may come even before the child is born. It begins with small, hard, painful swellings on the tongue and cheeks, which ulcerate and become very sore. There may be general indisposition and fever with it.

Treatment of this disorder requires *chlorate of potassium* as the principal medicine, in ten- to twenty-grain doses, three or four times daily. If the patient be feeble, iron and quinine will also be in place, with good nourishing diet, including plenty of milk. To the *mouth*, the applications above mentioned for *Ulcer* will be appropriate.

See **Scurvy** for the sore mouth which is a part of that disease.

Mumps. A mild contagious disease, which most people (not all) have but once; characterized by inflammation and swelling of one or both of the *parotid glands*. These are situated one on each side of the neck, just below the ear. In their healthy condition, they are so small that we do not either see or feel them; in Mumps they grow quite large and sore, and are hurt in the act of swallowing. There is little if any fever, and the attack lasts in all about a week. In a few instances, the disease undergoes a transfer (*metastasis*) to the brain or some other part; and then it may be quite a serious illness. I never knew or heard of any one dying of mumps.

Very little *treatment* is worth while. Let the patient stay in-doors, on soft diet, take a moderate dose of citrate of magnesium or Rochelle salts, and bathe the swollen "chaps" with soap liniment, to which a little laudanum has been added. That is about all that need be done.

Once in a while, in a child especially, one of the parotid or submaxillary glands may undergo enlargement, not from mumps, which

lasts for a considerable time. The diagnosis in such a case may require careful consideration on the part of a physician.

Muscæ Volitantes. "Flying flies," literally. These are spots or specks, rings or strings, floating before the sight of one or both eyes. They often look like chains of small pearls; rising when the eyes are turned upward, and slowly settling down again. They are tiny, semi-opaque, solid particles floating in the *vitreous humor* of the eye, in front of the retina. One may have them, as I have myself, for twenty or more years, without their interfering with sight. Fixed dark spots, coming between the sight and objects in view, and gradually growing larger, are more ominous; they may increase so as to end in blindness.

Myalgia. *Muscle-pain;* as neuralgia is nerve-pain. Fatigue causes temporary myalgic pain; an exhausted person may have it, especially in the back, without exertion. Its *treatment* requires rest and warmth, sometimes anodynes (as laudanum) to the parts affected.

Myelitis. Inflammation of the spinal marrow. See **Spinal Marrow, Diseases** of, in extended medical works.

Myopia. Near-sightedness; resulting from too great length of the eyeball, or too great convexity of the crystalline lens; making the image of an object *fall short* of the retina, unless it is very near to the eye. It is corrected by *concave* glasses, pushing the images farther back, so as to reach the retina. See **Hygiene, Care of the Sight,** page 405.

Myxœdema. A rare, incurable, constitutional disease of women past the middle time of life; consisting of a general swelling (without inflammation) of the connective tissue under the skin, especially on the upper half of the body. The face has a waxy-bloated appearance; the breast becomes large all over; stupidity or mental derangement follows, and death occurs within a few months.

Nail, In-growing. A wrong name; it is *out-growing* (or swelling) *flesh*, invading the nail, that is really the matter. The nail never grows into the flesh, while the latter keeps its natural place. But whenever anything causes the soft flesh of the toe, generally the great toe, to inflame, a long or sharp-edged nail against it aggravates the pain and soreness very much. It becomes excessively tender to the touch, and sometimes lames the foot in walking.

First, then, we must *soothe* and *heal* the inflamed part. Lying in bed, with a bread or flaxseed poultice on the toe; applying simple cerate freely over the sore place, night and morning; if very angry, lime-water and oil, in equal parts. When it gives way a little, then we should very carefully cut away so much as can be done of the sharp end and edge of the nail next the flesh. Take a small, *soft* bit of *lint* or linen, cut for the purpose, smear it with simple cerate, and, with the back of a penknife or the blade of a pair of scissors, gently push it in *between the nail and the flesh*, and let it stay there. Renew this every day, unless it seems to keep its place well.

If necessary, by a small strip of adhesive plaster, we may *draw the flesh away* from the nail also. In slow cases, *collodion* may be poured in, or applied with a hair pencil, to fill up the crack between nail and flesh; or *compound tincture of benzoin*, which makes a delicate artificial cuticle. A few cases may need "taking down proud flesh" by touching with bluestone or lunar caustic.

Rare instances occur of *malignant disease* of the toe, involving the nail. Such cases may require a *surgical operation*. None is ever necessary for the cure of simple so-called "In-growing Nail."

Navel, Started. Umbilical hernia. See **Hernia.**

Nephritis. See **Kidney,** Inflammation of.

Nettle-rash. A red, slightly swollen eruption, in wheals or patches, which burn and sting, as if the part had been touched by nettles. See **Skin Diseases.**

Neuralgia. Nerve-pain; that is, pain having its place, or cause, in a nerve. It may have *place* in a nerve, when its *cause* is at the nerve-*centre*, or in the *blood* and general system. Inflammation of a nerve-*sheath* may give rise to it, but not inflammation of other parts.

Faceache (tic douloureux), when not produced by disease of a tooth or inflammation of the cheek or jaw, is one example of Neuralgia. *Hemicrania* is Neuralgia of one side of the head. *Lumbago*, pain in the small of the back, may be either Neuralgia or *myalgia* (muscle pain). *Sciatica* is pain affecting the sciatic nerve, which lies along the back of the hip, thigh, and leg. Other nerves may be likewise affected. Tenderness on pressure often accompanies the pain. It is generally sharp, shooting, or darting in character.

Treatment. Three times out of four, at least, a neuralgic person is anæmic; that is, deficient in good, rich red blood. Nourishing food, pure air, warm clothing, and *iron* are the chief blood-restorers. Other medicines, possibly suitable, as quinine, valerianate of zinc, belladonna, morphia, etc., may be left to the physician to advise. Only severe cases will require the taking of opiates, or other anodynes, by the mouth or by hypodermic injection.

To the seat of pain, various remedies are applied, with varying degrees of success. *Laudanum,* soaking a rag with it and putting it on the part, covered then with oiled silk; *paregoric,* used in the same way; *chloroform,* so employed, which *burns* like mustard when kept from evaporating; *menthol,* the Chinese or Japanese remedy, now prepared in solid sticks; simple *hot water,* or anything hot; *direct sunshine;* the half of a *cut lemon;* equal parts of *chloral hydrate and gum camphor,* rubbed together; these are among the things frequently so employed. More severe, is raising a small blister over the part, and sprinkling on the raw surface a powder consisting of a grain of acetate of morphia and ten grains of gum-arabic. Other powerful local anodynes are *tincture of aconite,* rubbed into the part until the skin tingles; and *ointment of veratria,* ten to twenty grains in an ounce of lard. These last (morphia, aconite, and veratria) are, when wrongly taken, *deadly poisons;* not suitable to be reckoned among ordinary household medicines. They are among the edge-tools of the practice of medicine, hardly to be handled safely without the advice of a physician.

Neurasthenia. Nervous debility. On this, I may quote part of a page from my "Essentials of Practical Medicine:"

"Neurasthenia is a term conveniently applied to a general deficiency of tone and strength in the nervous system; producing symptoms variously affecting either the *organic, sensory, muscular,* or *psychical* functions. If the *first* of these be involved, we have *nervous dyspepsia,* occasionally *diarrhœa* or *vomiting; amenorrhœa, dysmenorrhœa,* or *menorrhagia;* perhaps *retention of urine,* etc. When the *sensory* apparatus exhibits the results of neurasthenia, *neuralgia* is the most common symptom; sometimes, however, *anæsthesia* occurs instead, or *paralysis of special sensation; e. g.,* blindness or deafness. In the *muscular* apparatus, the same condition produces a tendency to *convulsions,* general or local. *Psychical* symptoms of neurasthenia are extremely various in both sexes. In females, all of the above disorderly conditions and actions have been commonly grouped together under the name *hysteria.*" (See **Neurataxia**; also, **Hysteria.**) "But they occur in men and boys also, under circumstances sustaining the view that in either sex the relation to the reproductive system is rather accidental than essential."

"Undoubtedly, neurasthenia bears an increasingly large part in the diseased states with which the physician has to deal in the artificial life of modern society, especially in great cities. *Causes* of neurasthenia are chiefly as follows: sexual or sensual excesses or abuses; very large use of tobacco; continued 'worry,' *i. e.*, fretting and wearing care about business, domestic, political, or other affairs; too laborious brain-work with insufficiency of sleep; social dissipation, with the same effect of deficiency of rest; unhygienic habits of bodily and mental inertia, typified by the *corset*, the *veil*, the *novel*, and the *sofa*. Predisposition to nervous debility, with some or all of its attendant ailments, is, beyond question, often *hereditary*. It is promoted, sometimes, by inheritance of the *gouty* constitution."

Treatment of Neurasthenia must vary according to the form which it takes, as well as its cause. When brought on, as it often is, by over-fatigue of mind or body, or by anxiety, social excitement, etc., total *rest* for a considerable time is the most important thing. The late Professor S. Jackson, of Philadelphia, urged strenuously the idea of this; which has been developed into a system of "rest-cure," by Dr. S. Weir Mitchell and others. In its completeness, this system requires the nervously exhausted patient (mostly a woman) to be separated from her family and friends, unless possibly one of them, acting as her nurse. She must lie in bed, and see no visitors, read no books nor papers, and write no letters. Life must be, to her, for a time, a comfortable blank; diversified by her daily hour or two of rubbing (massage) by a manipulator; and, perhaps, the application, once or twice a day, of electricity. Her diet consists chiefly of milk, of which she is to take a great deal; as much, indeed, as she can swallow and digest. After from three to six weeks of this régime, she may, in favorable cases, be allowed gradually to leave her bed, read a little, see somebody, and, at last, return to the world.

No doubt a certain number of over-driven people (especially those who are victims of social dissipation) are benefited by going through a period of this extreme isolation and quietude. *Rest*, however, may often be obtained sufficiently without banishment from home, or even total isolation, at home, from one's friends. Good medical judgment is necessary to decide about this in each case.

Other treatment for Neurasthenia includes the use of *tonics*, as iron, quinine, nux vomica, phosphates or hypophosphites, etc.; and, when available, sea-bathing (or at least sea air), or visiting mountains or other resorts for change of scene.

Neurataxia. This term has been proposed by me, meaning loss of harmony and coördination in the performance of the functions of the nervous system, to designate the state of things in *hysteria*, as something

more and other than mere nervous *debility* or *neurasthenia.* Other authors have not, however, I believe, as yet adopted the term Neurataxia. See **Hysteria.**

Neurosis. A general term, applicable to any disorder of the nervous system. Hysteria, epilepsy, and chorea, for examples, are, or may be, called *neuroses.*

Night-Sweats. See **Consumption.**

Night-Terrors. A child, from three to eight years of age, goes to bed apparently well. In an hour or two, perhaps later, it screams with sudden fright, and calls for its father and mother; sitting up in bed, but not knowing any one who goes to it.

Lift the child at once from the bed, well wrapped, of course, and carry it around the room once or twice. Pass over its forehead and face a napkin or towel dipped in cold water. Give it then a teaspoonful of camphor water. Let it relieve its bladder, put it to bed again, and it will sleep till morning. Then do not wake it up; let it sleep its sleep out, to tranquillize the brain. During the next and following days, see that it *eats nothing indigestible* at supper; that it is neither over-violent in exercise nor has its mind much excited towards the end of the day; and that there is enough *fresh air* admitted into the chamber where it sleeps.

Night-terrors do not show that the *brain* is *diseased.* But they do prove that it is very sensitive; and extra care should be taken not to aggravate this, in any way, into something more serious.

Nipple, Sore. Cracked Nipple is one of the troubles to which mothers and wet-nurses are liable. To prevent it, the nipple should be wiped dry with a soft napkin immediately after the child has left it. On the slightest soreness being felt, apply *cold cream* ("ointment of rose-water" of the apothecary); this being very gently wiped off before the babe is put again to the breast. Lime-water, alum-water, and oak-bark tea (one at a time, of course), are good *astringents* to wash a tender nipple with; using a fine soft sponge for the purpose.

When a nipple has actually cracked, it must be helped to heal, by soothing and protective applications: as *compound tincture of benzoin* (very good) or *collodion* (best with one-fiftieth part of glycerin added), applied with a camel's-hair pencil. Either of these will make a thin coating over the fissure, like an artificial skin. A *nipple shield* must be worn, or a breast-pump used, to avoid the pain and irritation of suction by the child, when a nipple is cracked or very tender.

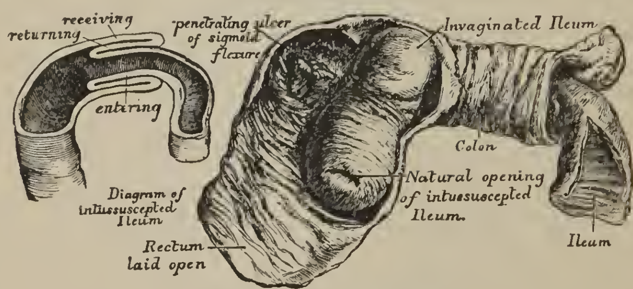
Nurses' Sore Mouth. See **Mouth, Sore.**

Obesity. Excessive increase of fat about the body. See **Hygiene** (p. 246).

Obstruction of the **Bowels.** Much more than mere constipation, this is one of the most dangerous of accidents. It is less uncommon in young children than in older persons. Its *causes* are obscure; various kinds of obstruction may occur. Sometimes *hardened feces* (excrement) may collect, from long neglected constipation, into such a mass that the lower bowel has not power to expel it. In a few cases, *curds of undigested milk* have blocked up the rectum in the same way. These, or accumulated feces, when discovered by examination, may be scooped out with a spoon.

Intussusception is the tucking or slipping of one portion of intestine, stovepipe-like, into another. The outer part then contracts upon it, holding it fast. *Twisting* of an intestine may take place; or even its getting tied in a knot. There are, also, still other conditions, besides *strangulated hernia* (rupture) which may cause a mechanical obstruction of the bowels. (See "Essentials of Practical Medicine.")

FIG. 226.



INTUSSUSCEPTION OF INTESTINE.

Symptoms of Obstruction of the Bowels are: 1. Obstinate, unmovable constipation; purgative medicine having no effect. 2. Vomiting; at first of food taken, bile, etc.; later, of fecal matter (excrement; "stercoraceous" vomiting). 3. Pain and great distress, with coldness and prostration. 4. In some cases, without any natural discharge, blood passes from the bowels. 5. When the obstruction is low down, the belly may be much swollen with wind (meteorism). 6. In certain instances, with less general swelling, a firm *tumor* may be felt in one part of the abdomen.

Often, the greatest degree of medical skill will not enable a practitioner to make sure of the exact nature of the obstruction; while of the existence of it there is no doubt. The *treatment* of such cases, therefore, is subject to great difficulty. Probabilities are all that can be acted upon.

Whenever a person has constipation of the bowels which does not give way after taking ordinary active purgative medicines, send for a physician. Meanwhile, let the patient be put into a quite warm bath (96° or 97°) and remain in it for fifteen or twenty minutes. After being thoroughly dried, if the doctor has not yet arrived, let the patient, lying on a bed, be *lifted up by the heels* by one or two other persons; hoping thus to displace the wrongly caught portion of gut, if it be intussusception. If no relief follows, and medical aid cannot be obtained, the only other process I can suggest for an unprofessional person to venture upon is, to inject, with a common enema-syringe of either kind, two or three pints of *warm water*, not violently, but steadily, one quantity after another. Sometimes this will loosen things out, happily.

It is now not uncommon, in such a desperate state of things as some cases of Obstruction of the Bowels present, for surgeons to open the abdomen by a careful incision, to ascertain the nature of the trouble, and rectify it. This operation is not without danger; but unrelieved obstruction is almost always fatal. If no such operation is concluded upon, after other measures fail to give relief, it is usual to administer opium in regular doses (a quarter to a half grain every three or four hours while awake) to tranquillize the system; and, at the same time, only liquid food in small quantities being given by the mouth, or *rectum* (lower bowel), waiting to see what nature can do. Perhaps in one case or two out of fifty spontaneous recovery may result.

Odontalgia. See **Toothache.**

Œdema. Watery swelling; local dropsy. See **Dropsy.**

Œsophagus, Stricture of. A narrowing of the lower gullet, making it very difficult to swallow anything. It is a rare affection; one of its causes being, swallowing a corrosive poison, in quantity not quite sufficient to cause death. For its *treatment*, see professional works.

Oinomania. See **Methomania.**

Ophthalmia. See **Eyes, Diseases** of. *Egyptian* Ophthalmia is a violent form of inflammation of the eyes, often producing blindness. New-born babies sometimes have a very serious kind of suppurative ophthalmia, which, without skilful treatment, may destroy their sight. It should receive immediate attention from a physician. An excellent wash for it is alum-water; a teaspoonful of alum in a tumblerful of water; a little at a time being gently poured between the lids, several times daily.

Ophthalmic (or *Exophthalmic*) **Goitre.** Also called *Thyrocardiac Disorder.* In this singular and not common disease, three things are united, which seem to have no necessary connection: enlargement of the thyroid gland in the neck, throbbing of the heart and arteries, and

staring prominence of the eyeballs. It is a slow chronic disorder; recovery from it may occur, but it often lingers for months or even years. A person suffering from it should live a very quiet life, avoiding much exertion or excitement. *Digitalis, veratrum viride, iron,* and *electricity* are the remedies that seem to give the most hope of benefit in its treatment.

Opisthotonos. Bending the head and body backward, in *tetanus* (lock-jaw) or *hysteria,* so that only the head and heels touch the bed. It is a symptom, merely; not itself a disease.

Orthopnœa. Difficulty of breathing, so great that the patient must be propped up all the time. It exists in many cases of advanced *heart-disease, lung-disease,* and also *abdominal dropsy;* in the last-mentioned case, the fluid pressing against the diaphragm when the patient lies down. Orthopnœa is temporarily present, also, during an attack of *asthma.* Remedies for it are, of course, those required for the disorder of which it is one of the symptoms or effects.

Ovarian Dropsy. See **Women, Diseases** of.

Ozœna. A chronic disease of the inner nostrils and neighboring cavities of the upper jaw bones, with an offensive discharge. It is very hard to cure; the treatment approved by specialist practitioners is beyond the scope of domestic medicine. One simple measure alone may be here referred to, which is likely at least to palliate the complaint, and cannot do harm: *smelling tar,* from a wide-mouthed bottle, warmed at the time, for several minutes together, three or four times daily.

Palpitation. See **Heart, Diseases of.**

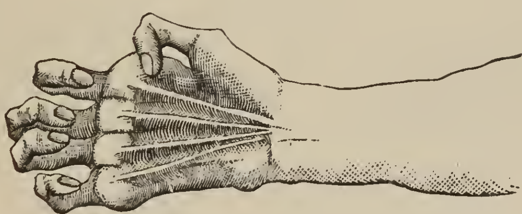
Palsy: Paralysis. Loss of *power*, or of *feeling*, or of both together. It may result from disease of the brain, as when it follows apoplexy; or from disease of the spinal marrow; or of a nerve, as when paralysis of one side of the face is produced by a cold.

Hemiplegia is Palsy of one side of the body; *Paraplegia*, of both legs and feet. *General* paralysis involves all the limbs together, and some other parts. Sometimes there is *local* paralysis, of one or a few muscles; or a local *anæsthesia, i. e.*, loss of sensibility of a part.

Infantile Paralysis has been spoken of in its place. Much the larger number of cases of palsy occur in elderly people. One variety is *shaking* palsy (*paralysis agitans*). *Hysterical* paralysis is more often curable than any other kind.

For the *treatment* of Paralysis, there is always time enough to obtain deliberate medical advice and attendance. Among the remedies likely to be recommended, are, *counter-irritation*, at an early stage; later, *massage* (which see, under **Nursing**), *electricity*, *hot baths*, and small and care-

Fig. 227.



WASTING PALSY.

fully regulated doses of *strychnia*. Paralysis following apoplexy, and other cases of it in old people, are seldom recovered from; and repeated attacks are very apt to follow, until the fatal end. Yet there are some instances of paralytics living for many years.

Parasites. *Epizoa* is the scientific name for external parasitic animals. Lice, fleas, ticks, and bed-bugs are such, large enough to be seen as well as felt. The *itch animalcule* (see **Skin Diseases**) is discoverable only with the aid of a microscope. Lice and fleas are true insects; ticks and itch animalcules are more nearly related to spiders (*arachnida*).

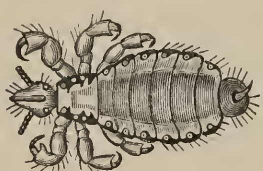
To get rid of lice, a "hand to head" warfare, armed with a fine-toothed comb, is the most effectual process; cracking all the *nits*, or eggs, lodged on the hairs, as well as the creeping things; and dusting afterwards with staphysagria to finish them. Washing the head (and body if there; as one sort, *crab-lice*, infest a part of the body) with

strong soapsuds, after a general extermination, will complete the work. A woolly or tangled head of hair had better be shorn first.

Fleas are famous jumpers, and so not easy to catch. They make large and rather sore bites. By shaking and beating out clothing, and bathing, one can get rid of personal followers; but beds and bedding are worse. *Flea-powder* (much needed and used in the East) is probably either *pyrethrum* or *cocculus indicus.* I proved the worth of one kind, I think *pyrethrum,* in Egypt. It acted like chloroform on the intruders. They slept and so did we; and in the morning we swept them out, *à la Sennacherib.*

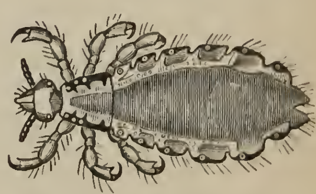
Bed-bugs, small, round, flat, black, bad-smelling vagabonds, hide themselves well in all sorts of cracks and crannies; in bedsteads as well as in beds and clothing. They are ugly to look at, and bite unpleasantly. To get rid of them, besides persevering detective work, the bedstead and its surroundings must be attended to. *Corrosive sublimate dissolved in alcohol,* or alcohol and water (two or three grains in a fluidounce) is

Fig. 228.



MALE LOUSE (MAGNIFIED).

Fig. 229.



FEMALE LOUSE (MAGNIFIED).

the most effectual wash for such a purpose. *Benzine* also will answer very well.

Ticks get on the body from plants; as wild raspberry bushes, etc., in the country. They are annoying, that is all. The most objectionable lodger in or under the skin is the *chigoe,* or *jigger,* a kind of flea of South America.

Mosquitoes are rather itinerant visitors than parasites. To protect oneself from them, a cloud of smoke is in some places available. Otherwise, they are not likely to bite a face or hands wet with spirits of camphor. The same is a good application to "kill" the itching of the bites. Ammonia, however, is still better. Pennyroyal, a common weed, has the reputation in the country of keeping off mosquitoes.

There is a very small arachnid (acarus) sometimes present in the follicles of the face, when there is a pimply (papular) eruption, called *acne.* Of this, and the *sarcoptes* of itch, more under **Skin Diseases.**

Parotitis. See **Mumps.**

Pellagra. A very serious affection of the skin, known in Southern Europe. See **Skin Diseases.**

Pemphigus. See **Skin Diseases.**

Pericarditis. Inflammation of the outer covering of the heart (pericardium). See **Heart, Diseases** of.

Peritonitis. Inflammation of the *peritoneum*; the delicate serous membrane lining the abdomen, and enwrapping all its contained organs; stomach, intestines, liver, kidneys, etc. On account of its extent, and the vital importance of these parts, Peritonitis is always a suffering and dangerous disease. It may be caused by blows or other injuries; by exposure to cold and wet; the bursting of an aneurism, or of an abscess of the liver or bowel (*typhlitis*), or perforation of the stomach or bowel by an ulcer (as in typhoid fever); by some of the "accidents" following child-bearing; or by tuberculization of the abdominal glands, or of the peritoneum itself.

Symptoms of Peritonitis are, diffused abdominal pain and tenderness, increased by the slightest pressure or movement, even taking a deep breath; vomiting, constipation, swelling of the belly, and fever, with a very rapid, though not full, pulse. In bad cases, there will be also delirium, extreme restlessness, and prostration, tending towards collapse and death. *Simple* Peritonitis, however, is recovered from, under favorable circumstances, in a considerable number of cases. *Tubercular* Peritonitis may always be expected to end fatally, after a long and slow progress. *Puerperal* Peritonitis, when not epidemic (puerperal fever) though serious, is not nearly always destructive of life; when, however, it occurs as a part of epidemic or endemic Puerperal fever, at least half of those affected are likely to die.

Treatment of Peritonitis will not, of course, be undertaken by an unprofessional person, when it can be avoided. In lecturing to medical students as professor of the Practice of Medicine, my instruction has been that, in *simple* acute Peritonitis, bleeding from the arm should be the rule, and leeching the abdomen (fifty to a hundred American leeches) should follow; only decidedly feeble patients affording exceptions. Experience warrants me in believing that such is good practice. If any inflammatory disease, besides inflammation of the brain, can be benefited by drawing blood, I believe this to be the case with acute Peritonitis. I regret that a different habit of thought and practice has prevailed in the medical profession since about 1860. There are signs of a gradual return to the old and sound view, that, while bleeding may be abused, so as to waste a patient's strength, there are some instances where it will save it from the worse weakening of a dangerous disease.

After leeching, or without it if you cannot get it, poulticing with

flaxseed-meal, softened with a little lard, after pouring upon the poultice a teaspoonful of laudanum, will be well. When there has been no leeching, some practitioners lay over the abdomen a light piece of flannel wet with oil of turpentine, as a counter-irritant. Others prefer a coil of india-rubber tube, through which ice-water is made to flow constantly, without wetting the patient.

Perfect rest in bed is indispensable in Peritonitis. No purgative medicine is considered suitable, except enough to maintain a moderate daily movement of the bowels. Yet an injection of pure sweet oil, or oil mixed in warm soapsuds, may be used to empty the lower bowel, every day or two. The only food allowable must be soft and light; as arrowroot, tapioca, sago, rice-water, scalded milk, or, if feeble, beef-tea or chicken-broth.

No medicine has favor in the treatment of Peritonitis except *opium.* This is given in half-grain doses, more or less, every three or four hours while the patient is awake, to keep down nervous and inflammatory excitement. If "resolution" of the inflammation occurs, the patient will get well in a week or two. If, instead, it goes on to *suppuration* (forming pus or matter in the peritoneum), it will almost always end in death. See **Puerperal Fever.**

Chronic (*i. e.,* not acute; prolonged, slow) Peritonitis may be tubercular in nature, but is not always so. If not, there is hope, though doubtful, of recovery. In its *treatment,* besides rest, less opium than in the acute form, if any, is called for. Tincture of iodine may be painted over the abdomen as a counter-irritant; or a blister of moderate size may be there applied. Ointment of iodoform has latterly acquired a reputation in similar cases. I have seen excellent results follow the nightly application of cerate of carbonate of lead (two drachms of carb. lead mixed with an ounce of simple cerate).

Pernicious Anæmia. See **Anæmia.**

Pernicious Fever. See **Ague,** of which it is the worst form.

Pertussis. See **Hooping-Cough.**

Pharyngitis. See **Throat, Sore.**

Phlebitis. Inflammation of a vein. This does not often occur. When it does, the blood is apt to coagulate in the vein, forming a clot or *thrombus,* obstructing the vessel. Fragments of such a clot may be carried in the blood to the heart, and thence into the arterial system; if one of these fragments chokes or plugs an artery, it constitutes *embolism* (the fragment being an *embolus*). Embolism of the main artery of a limb, in a feeble person, may so interfere with its nourishment as to cause it to undergo mortification. See, also, **Milk-Leg.**

Photophobia. Dread of light; excessive sensitiveness of the retina,

so that the patient cannot open his eyes in the light. This is common both in acute and in chronic ophthalmia, and in inflammation of the brain.

Phrenitis. See **Brain, Inflammation** of.

Phthisis. See **Consumption.**

Piles. *Hemorrhoids* of medical works. These are small swellings, hard or soft, either just without or just within the *anus* (outlet from the lower bowel). Internal piles often *bleed;* sometimes enough to weaken a person a good deal. External ones, when hard, are in some cases not troublesome; but they are liable to attacks of inflammation, which may be very painful. With some patients, they are sore and painful at all times; especially when the bowels are moved.

Causes of Piles are, neglected *constipation; excessive* use of *purgative medicines;* sedentary living; *standing* on the feet a great deal, or sitting on *hard seats.* Pregnant women are often subject to them. The complaint is hereditary in some families.

Treatment of a "fit of the piles," that is, an attack of soreness and inflammation, should begin upon the very first feeling of soreness at the part, with the free and frequent application of *tallow, cold cream*, oxide of zinc ointment, or vaseline. Early greasing may put out an attack, like a commencing fire. Also, the *bowels* must be regulated; *not* purged, but kept gently open by moderate means. Besides fruit, the best things for persons having Piles are *rhubarb, sulphur,* and confection or fluid extract of *senna.*

Obstinate external piles may require persevering treatment with *astringent* ointments; as of *galls, tannin, carbonate of lead,* or *creasote.* Sopping or sponging the parts with *cold* water agrees with some; *hot* water, or soapsuds, with others. A short remedy is, *cutting* or *ligating* (strangling) the tumors, as a surgical operation. Sometimes, instead, they are treated by injecting them with carbolic acid.

Internal piles may need attention particularly on account of free bleeding. Cold water will usually help to stop this; so also (there is no contradiction—both make small blood-vessels *contract*) will hot water (110° Fahr.), if injected with a small syringe. Alum may be added to the water; or a few drops of tincture of chloride of iron. If there is serious hemorrhage, the patient must lie still in bed.

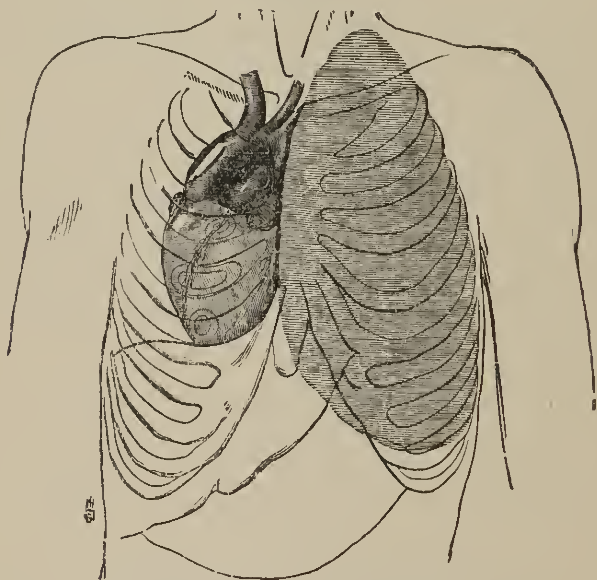
Plague. A very destructive oriental epidemic disease, most prevalent in summer (though not at its hottest) and in large cities. In the seventeenth century, it caused tens of thousands of deaths in London, Marseilles, and other European centres of population. Its worst localities formerly were Constantinople, Alexandria, and Cairo. It has not been known anywhere in Europe for more than a century; nor in

Egypt for twenty-five or thirty years. *Sanitary improvement* is gradually extinguishing it everywhere. Plague has never visited this country; so we need not here dwell farther upon it.

Pleurisy. Inflammation of the *pleura;* that is, the delicate serous membrane which envelops the lungs and lines the inside of the bony chest. "Taking cold," injuries (as penetrating wounds), and tuberculization (as in consumption) are its most frequent causes.

Symptoms of Pleurisy are generally easily recognized. Every breath gives pain, a *sharp stitch.* This happens because the layers of the pleura which rub over each other (one layer on the lung and the other on the inside of the ribs), when inflamed, adhere to each other, by the lymph

FIG. 230.



PLEURITIC EFFUSION DISPLACING HEART.

which exudes on them. Expansion of the lung in breathing, or rather, we should say, *lifting the ribs* to breathe, drags on such adhesions painfully. There is little cough in simple Pleurisy; more in *pleuro-pneumonia,* when the lung also is inflamed. The attack may affect one side only, or, in exceptional cases, both. Fever attends a decided attack. On auscultation, there may be heard over the inflamed part a *friction sound,* corresponding with the lymph-adhesion above spoken of.

The *second stage* of Pleurisy is that of *effusion of serum* into the cavity of the pleura. This is like the "raising" of a blister, but on a larger scale. With it, the "friction sound" on auscultation disappears;

and *dulness on percussion* becomes manifest, from the presence of fluid instead of air on the affected side. In bad cases, this presses the lung almost into a solid mass; and if the same thing happens with both lungs, death must result. Another unfavorable, though slower, course, is for the *serum* to change to *pus;* constituting *empyema.* Serum may be gradually absorbed; pus cannot. Hence the patient with empyema is worried out, with hectic fever, etc., in a few months, unless there is either a spontaneous or a surgical opening, to let out the pus. Within the last twenty-five years, physicians have acquired much more confidence than formerly, in assisting nature to get rid of large amounts of serum, or of any considerable amount of pus, collected in the chest. Even water, left long there, displaces one or both lungs, and sometimes the heart, and seriously cripples breathing, if not the circulation of the blood.

Treatment of acute Pleurisy, at the start, fifty years ago, always began with bleeding from the arm. This has, to my regret, now gone out of fashion. While there are, no doubt, not a few persons who would not bear bleeding well, some attacked with Pleurisy would get through their attacks much better for it. *Leeching* or *cupping* the inflamed side, I believe, ought to be the rule in Pleurisy, with very few exceptions. Even in consumptive patients, *dry* cups may be used with advantage.

Almost forgetting, in these remarks, that *Home* medicine, rather than professional "theory and practice," is our present subject, I return to it by saying that in every attack of illness resulting from exposure to cold, as Pleurisy mostly does, unless in a patient already exhausted from previous disease, I would, in the absence of a physician, give one early dose of a mild purgative. (That is, of course, unless there happens to be diarrhœa also present at the time; which is rare.) As to other medicine, I do not feel ready to urge it without the personal judgment of a physician upon the case. To him also must, of course, be left the question of possibly *tapping* the chest for an oppressive or rapidly increasing effusion. A *blister* on the side is a common and entirely reasonable application, at about the beginning of the second stage of the disease.

Pleurodynia. *Intercostal rheumatism;* that is, pain, increased on taking a long breath, in the muscles between the ribs. This pain is much less sharp and severe than that of pleurisy. It may be treated by the application, first, of a *mustard-plaster;* and when all the effect of this has gone off, a *warming-plaster* (Burgundy pitch, Allcock's porous-plaster, etc.), to remain on for several days, or until it comes off of itself.

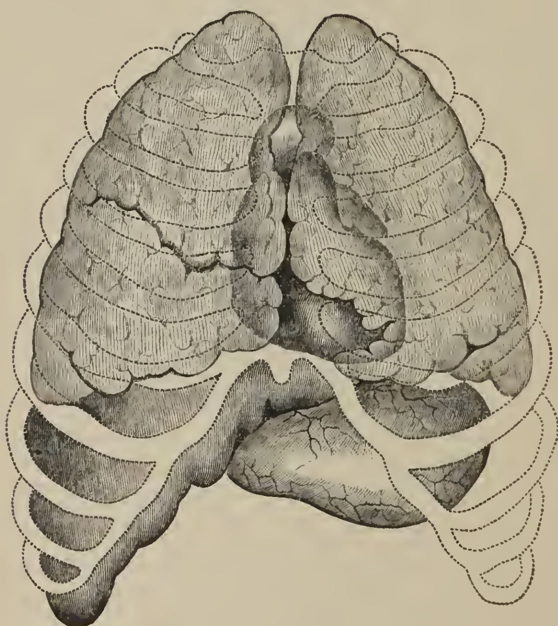
Plica Polonica. Polish Twist; a parasitic disease of the hair, unknown except in Poland or in some country not far from it.

Pneumonia. Inflammation of one or both of the lungs. *Causes:*

cold and wet, injuries, or tuberculization. The last of these comes under the conditions of pulmonary *consumption.*

Symptoms: pain, rather dull, in the chest, mostly on one side, sometimes (double Pneumonia) on both; oppression in breathing; a short, hacking cough; fever; in severe cases, delirium. In a day, or two or three, expectoration of reddish or reddish-brown mucus (*rusty sputum*) in not very large quantities. If the case goes on badly, this is changed after some days to a more abundant yellowish *purulent* expectoration: or, worst of all, rotten and *gangrenous.* The height of the attack is

FIG. 231.



LUNGS AND HEART IN PLACE.

reached generally between the fifth and the seventh day. When fatal, the end seldom occurs before the sixth day, and may be as late as the fifteenth or twentieth day.

Stages of Pneumonia, in usual course, are, first, *congestion* and commencing exudation of lymph; second, *consolidation,* with abundant exudation into the air-cells of the lungs (*hepatization*); third (not reached in the most favorable cases), *suppuration.* The last has variations, which need not here be described. Physicians detect the existence and progress of these stages chiefly by the *physical signs,* ascertained by *auscultation* and *percussion.* Of these, the distinctive one of Pneumonia is, in the middle stage, the *crepitant râle;* a fine, soft sound, like

what is heard when one rolls a few hairs, near the ear, between the thumb and finger. *Dulness on percussion* is present also, from the lung being almost made solid (hepatization, resembling the liver) from exudation of lymph through its cells, which in health are full of air. But the precise and extended study of these *physical signs* is too technical a subject for this book. (See "Essentials of Practical Medicine," or any other work on Practice.)

Treatment of Pneumonia has been a "battle-ground" of opinion amongst physicians during the last fifty years. Before that time, it was pretty much settled. If a lung was so much inflamed as to cause fever, as well as distress in breathing, the patient was bled, on the first or second day of the attack; he also took a good dose of an active cathartic, as Epsom salts, and he *generally got well.* I was brought up by my father, Dr. Joseph Hartshorne, a private pupil of Dr. Benjamin Rush, in this practice; and I never lost a case of simple Pneumonia in my life. Dr. Louis Gebhard, a contemporary of my father, told me, after fifty years of practice, that he had never lost a case of Pneumonia. People do nowadays often die of Pneumonia; even young, vigorous men, from thirty to forty years of age, among them; and these have not been bled. This point must not be further argued here, as this is not a professional book. But if any of my readers should be attacked with Pneumonia, while in the prime and vigor of life, I hope that his physician, if he will not *bleed,* will at least *cup* or *leech* between the shoulders or over the inflamed lung, and allow a good *purgative* dose, on the first or second, or even the third day of the attack. Time enough to feed up and stimulate, except in feeble patients, when the height of the acute inflammatory attack has been passed. In *Home* practice, I will name here no other medicine except *ipecacuanha,* to soften and loosen the cough; free early secretion being very serviceable in lowering the inflammation of the lung and oppression in breathing.

Poulticing the chest (after leeching or cupping, or, if such must be, instead of it) is very useful and important. A large and thick mush or flaxseed-meal poultice should be put warm on the diseased side, and covered with oiled silk. As soon as it begins to dry and get hard, have another ready and replace it, without allowing the side to be uncovered for a single second. Later a *blister* will be suitable, if the symptoms show obstinacy or slowness in "resolution" of the attack.

Some patients, especially broken-down people (from intemperance, etc.), such as are often seen in hospitals, will not bear the loss of blood well, whatever their disease. In hospitals, moreover, they are likely not to come under care until after the third day of the attack; and then it is *too late* for bleeding. In such cases, and in all very feeble persons,

quinine, beef-tea, and, carefully, alcoholic stimulants, may constitute the essential parts of the treatment. I am bound to add this much, after the somewhat sanguinary observations above made, on the treatment of Pneumonia.

Typhoid Pneumonia is inflammation of one or both lungs, with a *low state of the system* (not constitutional, but a part of the attack), more or less like that seen in typhoid fever. Physicians who may look at this must pardon me for suggesting that some cases *become* "typhoid" for want of active relieving early treatment. Others, however, are genuinely low in their course all through. These will bear no bleeding, and only *dry* cupping and poulticing; and they must be *supported;* not by profuse potions of alcohol, but by carefully regulated doses, watching their effects; also, by milk, beef-tea, or beef-*essence*, etc.

Pneumothorax. Air escaping from a lung into the cavity of the pleura; an opening being made from the lung by a wound, or by the breaking of the wall of an abscess or "cavity" of a tuberculous lung. This is a not uncommon occurrence in pulmonary consumption.

Podagra. An old name for **Gout**; which see.

Poisons. See the last part of this book, after **Accidents**, etc.

Poison-Vine Eruption. Most persons have seen this; very many have felt its unpleasantness. It comes from touching either the poison-vine (*Rhus toxicodendron*), or, with fewer people, the *Swamp Sumach.* The eruption is made up of a multitude of very small water-blisters (vesicles) on a red and sore surface. It itches and burns, very annoyingly; on the face and hands mostly, sometimes on the lower limbs and body. I was once two weeks in bed with it. Generally, the attack is over within a week. Nobody, I believe, ever died of it.

Treatment. Unless on a small surface of the body (as it sometimes appears) it is seldom possible to "nip in the bud" this eruption. Like murder and scandal, it "will out." I am not sure that it would be safe to "drive it in," if we could do so; an inflammation of some internal organ might result from retention of the poison in the blood. On a hand or arm, however, a stream of *hot water* will sometimes kill it after three or four applications. Caustics (as nitrate of silver) may do the same thing, but they require more care, and may leave marks.

Cooling and *easing* the irritation of the skin is the aim in this affection. Where the skin is not broken, painting (with a hair pencil) with weak *lead-water* is relieving. If *burning* is very intense, dipping the part, as the hand or the face, in *cold water*, and holding it there awhile, several times a day, will lower the heat. *Lime-water*, and a solution of *soda* in water, pretty strong, are, among many remedies of which I have

known the trial, the most generally useful when the eruption is at its height. I would try both alternately; laying soft light rags wet with the solution of soda or lime upon the part, and renewing them often enough to have a cooling effect.

Lately, Dr. S. A. Brown, U. S. N., has asserted that *Bromine*, ten or twenty drops dissolved in Oil or Glycerin, and rubbed gently over the poisoned part three or four times daily, is a specific for Rhus poisoning. I do not know of its being yet extensively so used.

Polypus. A swelling, rather hard, with more or less of a stem or narrow base, where it is connected with the body. Polypi are met with in the nose, and in other cavities communicating with the exterior. Their treatment (mostly by removal) belongs to special Surgery.

Porrigo. See **Skin Diseases.**

Presbyopia. Old sight. After forty-five, most people who have not been near-sighted are obliged to hold their books or newspapers farther off than before, to read well. Also, they need better light to read or work by, and cannot make out fine print at night. Three changes have now begun, which usually continue to go on slowly: 1. *Sensibility* is less in the eyes, requiring stronger light to make objects clearly visible. 2. *Adjustment* of the eyes to near objects is feebler, the *muscle of accommodation* (ciliary muscle) being one of the first muscles of the body to weaken with the commencing decline of life. 3. The *crystalline lens* becomes flatter and harder, so that its refraction is altered, and images are thrown too far back (behind the retina) unless objects are at some distance from the eyes. *Correction* of old-sight is obtained by using *convex* glasses, which bring the rays of light from objects sooner to a focus. It is well to begin to use glasses *as soon as the need of them is felt*, but not to have them any stronger than is necessary at the time. Oculists are now very exact about this adjustment. Moreover, *one eye* is often *older* (so to speak) *than the other*. When this is so, a differently focused glass should be chosen, after careful trial, for each eye.

Prolapsus Ani. A falling of the last part of the lower bowel through the outlet (*anus*). This is most common in children, from straining too long at stool. The gut can be replaced, with well oiled or larded fingers. The child should then not be allowed to strain when the bowels are moved. A high seat or chair will be best to prevent this. Only bad or long-standing cases will require surgical treatment; possibly, a few, an operation.

Prolapsus Uteri. Falling of the Womb. See **Women, Diseases of.**

Prurigo. Itching, as a continued disorder. See **Skin Diseases.**

Pseudo-membranous Croup. See **Croup.**

Psoriasis. A scaly disease. See **Skin Diseases.**

Puerperal Fever. An acute malady of mothers, beginning not many days after delivery. First there is a chill; then heat of skin, with a very rapid pulse; pain and tenderness, often swelling, of the abdomen; vomiting; in bad cases, delirium and collapse. About half the cases of it are fatal, within a week or ten days. *Post-mortem* examination shows, in most instances, the results of *peritonitis*. But, besides that (and inflammation of other parts, as the womb, abdominal veins, and lymphatic vessels), in Puerperal Fever there are evidences of a *general blood-disease,* of which the peritoneal inflammation is a secondary symptom—as sore throat is in scarlet fever, bronchitis in measles, etc.

Causation of Puerperal Fever is traceable to *foulness:* of the air, as in hospitals; of *contagion,* when carried by a physician or nurse from one patient to another; of *decay,* when perfect (vaginal) cleanliness of the person is not maintained after delivery. In the last of these cases, at least, *absorption* of foul material, from decomposition, is inferred, producing *septicæmia.* Some physicians consider all cases of this disease to be varieties of septicæmia; others regard it as an entirely specific disease.

In the *places* of its prevalence, it resembles erysipelas. It is at times *endemic* in lying-in hospitals, where a number of women are confined together. Worst, in predisposing to this, is the conjunction or nearness of such a hospital or ward to a surgical hospital. Practitioners find, from experience, that there is a risk in going from attendance on cases of erysipelas, as well as from those of Puerperal Fever, to attend in the lying-in chamber. If *obliged* to do this, physicians and nurses lessen the danger to those under their care by changing all their clothing, and washing their hands very thoroughly in solution of corrosive sublimate, chlorinated soda, or solution of carbolic acid. Puerperal Fever is sometimes *epidemic* in large cities; never in the open country.

Treatment of so serious a disease is never properly left to merely domestic care. It may, therefore, be said here only that, like other endemic and epidemic diseases, it does not bear *reducing* measures, such as bleeding from the arm, as single (*sporadic*) cases of peritonitis usually do; that *poulticing* the abdomen first, and *blistering* it afterwards, are as safe as any measures in its management; and that in its *prevention,* as well as treatment, *washing out* the vagina twice or thrice daily with a cleansing solution (lime-water, or glycerin, or corrosive sublimate solution, one part in 2000 of water) is very important. Of course, perfect rest

in bed is necessary throughout the attack, the bed-pan being used with as little motion as possible. The diet must be liquid, but concentrated in nourishing strength, for the support of the patient's system.

Purpura. A singular disease, in which, from a sort of leakage of blood from the small vessels, spots of various sizes, at first red, afterwards purple, brown, or yellow, form on parts or nearly the whole of the body. In a few cases actual hemorrhage from the skin takes place. There may be fever at first; afterwards prostration. The disorder is not without danger to life.

Causation of Purpura is obscure. The blood must be in fault; but some things tend to show that the state of the nervous system has much to do with the disorder. It is not likely to occur in a person whose general condition is that of balance of the different functions, as well as of tone and strength. Purpura is not the same thing as *scurvy*. In that disease there may be purple spots over the body; but other symptoms also occur in it, and it is distinctly traceable to a fault of the blood from *deficiency of some of the needful materials of food*. (See **Scurvy**.)

In *treatment* of Purpura, the condition of the patient must be considered. As a general statement, the medicines most worthy of confidence for it are *tincture of chloride of iron*, *aromatic sulphuric acid*, *quinine*, and *ergot*. Nourishing liquid diet (milk, beef-tea, chicken-broth, etc.) will be required. When the skin comes off over the purple patches, it will need protection, as by double layers of adhesive-plaster, or buckskin spread with soap plaster. Sponging the unbroken parts of the skin with alum-water, or whisky and water, will help to lessen the tendency to blood-leakage. When real *hemorrhage* from the skin occurs, death may be anticipated, with a bare hope of exceptional recovery.

Pyæmia. Literally, purulent blood; pus in the blood. When a vein is inflamed, or any part of the body undergoes suppuration, from which pus may be taken up by one or more veins, it may be deposited elsewhere; as in the lungs, liver, or under the skin, forming *abscesses*. This state of things is denominated Pyæmia. Its *symptoms* are: chills; low fever; rapid but feeble pulse; vomiting; delirium; swelling of the joints; and "gatherings," with formation and discharge of pus, in the lungs, liver, neck, face, armpit, or elsewhere. These symptoms are very much the same as those of *septicæmia* (blood-poisoning from matter of decay) except in regard to the formation of gatherings or deposits of pus. There does not seem to be any practically important difference between these two affections: although the *causation* of septicæmia has, so to speak, more opportunities than Pyæmia.

The *treatment* of Pyæmia is always attended by discouragement.

The aim of it is, to support the patient's energy in the struggle of nature to get rid of the intruding and disturbing matter. Quinine, concentrated liquid food, and alcoholic stimulation carefully regulated, are our dependence. Each abscess as it forms must, of course, have its own management. *Pure air* to breathe is very important in the care of cases of Pyæmia.

Pyrosis. Water-brash. See **Dyspepsia.**

Quinsy. *Tonsillitis;* inflammation of one or both of the tonsils. These are small glands, one on each side of the upper part (threshold, as it were; called the *fauces* in Anatomy) of the throat. These glands swell when inflamed, and grow red, sore, and painful. Swallowing gives much distress; and even speaking may do so. In a very bad case, one or both tonsils may be so enlarged as almost to check breathing. In a few days, *suppuration* is likely to occur; and when the gathered tonsil breaks and discharges its matter, relief at once follows.

Tonsillitis appears to have the same causation as common "sore throat," namely, "catching cold;" but some persons are much more liable to it than others. Those whose tonsils are large from infancy not unfrequently have several repeated attacks. Physicians sometimes *cut off* a large part of a permanently swollen tonsil, to get rid of such a tendency or habit. This is a simple and scarcely painful operation when the tonsil is not inflamed at the time.

Treatment of Quinsy is essentially that of a "cold" with sore throat. Give a good dose of a saline cathartic; citrate of magnesium, Rochelle salts, Tarrant's aperient, or, if the patient be robust, Epsom salts. Make some flaxseed lemonade, and let the patient drink a little and often of it. Gargle the throat (gently) with alum-water, or tincture of myrrh in water, or *hot strong tea* (an excellent gargle), three or four times a day. Bathe the throat repeatedly with soap liniment to which water or spirit of ammonia (a tablespoonful in four ounces) has been added. If it is evident that a tonsil is going to "gather" (suppurate), poultice the neck with flaxseed-meal. When spontaneous opening is delayed, and the swelling in the throat is alarming, a physician may think it best to make an incision to let out the matter. No unprofessional person, of course, will undertake that operation.

For enlarged tonsils, not acutely inflamed, various applications are used to "shrink them up;" not always with much success. Nitrate of silver has always disappointed me in this employment of it. Strong solution of tannin or glycerole of tannin may do better; but I doubt whether anything short of the "guillotine" operation, above mentioned, is likely to have more effect in this way than will follow from frequently gargling the throat with simple *ice-water*.

Rabies. Rabies Canina; canine madness; *Hydrophobia* (which see).

Red Gum. A queer nursery name for a rosy redness over parts or the whole of the body of an infant, with more or less of a pimply eruption. Starch or arrow-root powder and oxide of zinc ointment are suitable applications for it, with magnesia if its bowels are costive, lime-water if it has diarrhœa. Indigestion is a common provocative cause of this affection, which physicians call *strophulus*, or *lichen strophulus*.

Relapsing Fever. This disease, which none of my readers are likely to see, is almost described by its name. There is a continued fever for from five to eight days; with headache, vomiting, constipation, perhaps yellowness of the skin, pains in the back and limbs. Then comes a copious perspiration, and the fever goes off. But, on the fourteenth day from the beginning of the attack, the fever *returns* (relapses), and lasts for another time of from three to eight days. About one in ten, or a less proportion, of white persons, and a larger number of colored patients, die of the disease.

Relapsing Fever has been called "famine fever," because it so generally occurs as an epidemic or endemic among the poorest and worst situated classes in large cities; often in Northern Europe; a few times only in New York and Philadelphia. In its *treatment*, a mild saline purgative medicine will be proper at the beginning. If headache is severe, dry cups may be applied to the back of the neck. Citrate of potassium or acetate of ammonium in solution will answer well through the fever period to lower the temperature and promote perspiration. During the remission of the fever, moderate doses of quinine (ten or twelve grains in the course of a day) will be appropriate for *tonic* effect. Quinine has been shown to be not capable in this fever, as it is in intermittent, of preventing the coming of the relapse. In the second fever, weakness may be so great with some patients as to require concentrated liquid food and alcoholic stimulation or support.

Remittent Fever. Autumnal Remittent; Bilious Remitting Fever. This is one form of *malarial* fever (see **Ague**); differing from intermittent in that the fever does not go off (intermit) during the attack, but only *remits* or *lessens* in violence, to return in full force within a few hours.

Remittent Fever generally, but not always, begins with a chill. Then follow all the symptoms of fever; headache, flushed face, hot dry skin, rapid and rather full but soft pulse, thirst, constipation of the bowels, scanty, high-colored urine. Vomiting is common; delirium occurs in bad cases; yellowness of the skin after a few days is not unusual. The *remissions* come generally in the morning, but sometimes late in the

day; seldom at night, at least before midnight. In them the fever does not go off, but the pulse becomes slower, the skin less hot, and perhaps a little moist; the headache is lighter, thirst less intense, the breathing slower. So the attack may continue for a number of days. How long it would run without being interrupted by treatment, I do not know. All the cases I have seen were broken and cured by quinine, which is *the* remedy here, as it is in intermittent fever.

In *treatment*, begin with a good, though not too large, dose of saline cathartic medicine (does the doctor begin *everything* with such a dose? Well, yes; *nearly* so, and with good reason, sustained by experience), as citrate of magnesium, Rochelle salts, etc. Then during the height of the fever give, every two hours, citrate of potassium solution (neutral mixture, or effervescing draught; see pp. 565, 569). On the beginning of the first remission begin to put in quinine; two grains every two hours, while the patient is awake—until a full remission comes, with free perspiration, and copious or at least considerable discharge of urine. Then lessen the dose of quinine to one grain every two hours; and after another day get it down to eight grains a day; this may be continued on for two or three weeks with advantage.

Plenty of cold water to drink will be important during the fever heat. If vomiting is troublesome, ice, a little very often, will agree best with the stomach. Lemonade or orange-juice is generally acceptable. *Food* can only be taken in small quantities, and in the liquid state; oatmeal gruel, toast-water, milk with lime-water, etc. For the vomiting, a spice-plaster will be good, or a piece of flannel wet with essence of ginger, laid over the pit of the stomach and covered with oiled silk.

If any one should be (as may happen, as Remittent is a *country*, not a *city* disease) caught in charge of a case of this malady without a physician, the above described treatment will be pretty sure to carry the patient through. There are, no doubt, especially in some intensely malarious places, as South Carolina rice plantations, or tropical "jungles," fatal cases of Remittent Fever. But I never saw one, although the disease has not, until during the last few years, been rare in the suburbs and rural vicinity of Philadelphia. I have met with a few tedious cases, requiring some variation of treatment; but the consideration of such may be left for more extended medical works. *Complications* of Remittent Fever, such as pneumonia, inflammation of the brain, etc., require treatment (besides the use of quinine) appropriate to each of the special complicating affections present. *Convalescence* from the attack will be likely to call for building up, with iron, etc. *Change of air*, especially if frost has not yet come, will be highly important. Whoever has had one attack of malarial fever in a place had better

get out of it as soon as practicable, and never go back to it. It is quite possible to survive a number of such attacks; but they are sure to injure, and may ruin, the constitution for life.

Retention of Urine. The most frequent cause of this, in men, is *stricture* of the *urethra,* through which passage the urine passes out from the bladder. For this there must be surgical treatment, including the use of the *catheter* (see **Nursing**), the consideration of which would be out of place here. See pages 509, 562.

Women sometimes have retention of urine within a short time after childbirth, from pressure on the neck of the bladder. A catheter may have to be used for this. Hysterical women also occasionally suffer from such retention. In either sex, it may occur as a symptom of *low fever,* as typhus or typhoid fever. It should be thought of and examined for, in all low states of the system. If very little or no water be passed, ascertain whether there is fulness or moderate swelling at the lower part of the abdomen. *Percuss* there (tapping upon one finger, laid on the part, with the tip of another) to find whether it gives a clear or dull sound. If the latter, a catheter should be introduced carefully into the bladder to draw off the water; and, if water comes through it, this should be done twice in twenty-four hours. If *no water comes,* there is *suppression* of urine, which is worse than retention; a very unfavorable sign in any disease.

Now and then we meet with cases of spasmodic retention of urine, from irritation of the bladder or its outlet, for which locally tranquillizing measures are found to be relieving. Such are, sitting in a warm hip-bath; applying cloths wrung out of hot water to the genitals and the lower part of the abdomen; an opium suppository (a grain of opium in a small piece of cacao butter), or a laudanum injection (thirty or forty drops of laudanum in half an ounce of starch), by means of a small syringe, into the bowels.

Retina, Detachment of. The Retina (see **Anatomy**) is the extremely delicate membrane at the back of the interior chamber of the eye. Upon it, as upon the "sensitive plate" of the photographer's apparatus, the images fall, by means of which we see objects. It may be partially or almost entirely loosened from the tissue behind it: 1. By apoplexy (effusion of blood) of the eyeball. 2. By dropsical effusion in the same region. 3. By inflammatory action (*retinitis*) resulting in degenerative change. 4. By slow degeneration, not caused or preceded by inflammation.

The retina being indispensable to sight, any degree of its detachment must impair vision; and a large extent of such a change must cause actual blindness. This, as an effect, makes itself known at once; but

the *cause* of the blindness can be made certain only by examination of the eye with an *ophthalmoscope.* Retinal detachment is, as a general fact, incurable. Only in rare instances will the loosened fragments be dissolved in the *vitreous humor,* and a partial repair of the damaged part of the retina take place, so as to suffice for tolerable sight. Such a result is never, in any case, to be expected.

Rheumatism. This name is commonly given to at least two kinds of complaints: slow, *chronic,* non-inflammatory Rheumatism of the muscles, and *acute,* febrile, *inflammatory* Rheumatism of the larger joints. The latter is much the more serious disease.

Inflammatory Rheumatism only occurs in certain individuals and families. It appears to be brought on by exposure to cold and wet, and yet it is not uncommonly met with in summer. One joint after another, or several at once, are apt to be affected; the wrists, elbows, knees, and ankles all in turn or together swell, become hot, painful, and tender to the touch. Fever is present, with a rapid, full, and rather hard pulse, and high heat of skin; although moisture may be present at the same time. The great *danger* of this disorder is, the liability to *heart* inflammation as a part of it; *endocarditis* (within the heart) or *pericarditis* (outside of the heart). (See **Heart, Diseases** of.) The attack often lasts three, four, or six weeks; sometimes longer yet; and its effects, in crippling the joints, or damaging the heart, may continue through a lifetime.

Treatment of Inflammatory Rheumatism is in part general and in part local. If in a gouty constitution, *colchicum* will do good in shortening the attack. Otherwise, the two remedies in which physicians now have the most confidence are *alkalies* (potassa and soda) and *salicylic acid.* The two may be very well combined; and so the attack may generally be abridged to one or two weeks' duration, with much less suffering. (For doses of salicylic acid and salicylate of sodium, see page 605.) Care is requisite in using such powerful medicines, which are not well adapted for domestic practice. Overdosing with salicylic acid is poisonous.

Local treatment of the inflamed joints has for its intention the relief of pain. Cotton wadding, rubber-cloth covering, and laudanum are the most effective applications for this purpose. My preferred plan is to lay over the painful joint a soft rag wet with laudanum, and bind gently over this a piece of oiled silk. This will generally lull the pain very much. Some limit to the amount of laudanum used is necessary, as it is partly absorbed through the skin. A patient of mine once thus covered all his large joints with laudanum, and in consequence slept most of the time for two days. With children, such outside anodyne

drugging would be dangerous to life, except with the use of only a few drops of laudanum at a time.

Chronic muscular Rheumatism (sometimes stiffening also the joints) is quite a different disorder from the above. It is unfortunate, indeed, for them to go by the same name.

In ordinary language, every pain, soreness, or stiffness of muscles or joints is called rheumatic. The first effect of a draught of cold air upon the shoulder or back of a person sitting or lying still, is *pain*. Next, soreness and stiffness on motion of the part. "Stiff neck" is a familiar example of this. It becomes inflamed in many cases; but this is a local inflammation, without fever, and not flying from part to part, as in acute Inflammatory Rheumatism. (Gouty subjects, it is true, have sometimes flying rheumatic pains; a mixture of complaints, constituting *gouty rheumatism;* which does not receive enough attention in many medical books. See **Gout**.)

When such an attack begins, as the result of cold, *heat* is its natural and effectual remedy. Sitting near a hot grate or stove, or applying a (not too) hot flat-iron or bag of hot water to the part, will, if resorted to early enough, often give prompt relief. Should such measures not succeed at once, however, there will be no gain in continuing them long. *Bathing* with soap liniment, with or without the addition of other things (as *ammonia, oil of sassafras,* and *laudanum;* see **Remedies**) will then come in place. *Warming-plasters* may follow, and, lastly, protecting the susceptible parts with flannel, etc., from the renewed action of cold. If there be any tinge of *gout* in flying rheumatic attacks, *oil of cajuput* (six or eight drops on a lump of sugar, three times a day for a day or two) will prove an excellent remedy.

As a local protective to an affected joint, some patients find a simple covering of thin *india-rubber* to answer well. Dr. John K. Mitchell, of Philadelphia, many years ago, pointed out that rheumatism often, if not generally, *centres in the spine.* Accordingly, I have repeatedly known the application of a dozen dry cups (left on fifteen or twenty minutes), or a large mustard-plaster, along the *back*, on each side of the backbone, to do good, even when the pains were only in the limbs. Chronic rheumatism may be, especially in old people, a tedious affair.

There is a much more formidable affection of the joints, sometimes met with in persons past middle life, best named by physicians *arthritis deformans,* but also called, much less accurately, rheumatic gout. In this, one joint after another becomes stiff, deformed, and useless; the patient getting to be at last altogether helpless. This is an incurable disease. (See, also, **White Swelling**, of the Knee.)

Rickets. A disease consisting chiefly of imperfect development of

the bones, with general debility; common among the children of the poor in the great cities of Europe, but rare in America. The bones are brittle; the spine becomes curved and the limbs crooked; the teeth fall out with early decay. Convulsions are not unfrequent, and the child so affected seldom lives long. The *treatment* of Rickets is, in a word, *building up,* if possible, the constitution of the child, which is failing and dying from insufficient nourishment.

Ringworm. A rounded patch of diseased skin, most common in children. See **Skin Diseases.**

Roseola. See **Skin Diseases.**

Rötheln. *German Measles;* sometimes called *French* Measles; see **Measles.**

Rubeola. One of the old medical names for measles; now confined by some authors to *rötheln* or German measles.

Rupia. A scabby disease of the skin. See **Skin Diseases.**

Rupture. *Hernia;* a protrusion of a portion of intestine, or of its covering (*peritoneum*) through a natural or unnatural opening.

There are three places through which a Rupture is most likely to take place: at the groin; just below the groin; and at the navel. These are called by physicians *inguinal, femoral,* and *umbilical* hernia, respectively. Navel (umbilical) rupture is met with in newborn babes, and in women who have had children; seldom in men. The most common kind of all is *inguinal* hernia. In this a knuckle of bowel, or a portion of peritoneum, is forced out (by straining at stool, riding hard on horseback, or some severe muscular effort) through two successive openings, called the *internal* and *external rings.* These, in man, are naturally penetrated by the spermatic cord. (See **Anatomy.**) When a part so protruding is not soon returned and kept in its place, the rings are stretched; and more and more of the bowel comes down. If still neglected, at last it becomes *irreducible.* Persons have been known to have a bag of this kind hanging down almost to their knees.

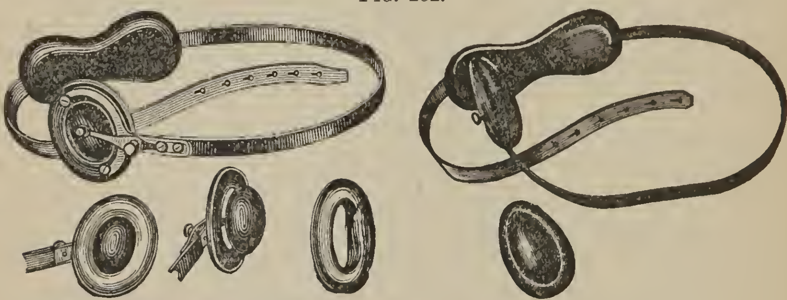
The proper thing is, for a rupture to be reduced as soon as it is discovered; and then a *truss* should be worn. This is a spring belt made to go around the body, with a pad fitting over the rings, so as to plug them up, so to speak, and prevent the parts from coming out after being replaced. This will seldom cure the trouble, but it prevents much inconvenience from it. A truss must be made to fit well, or it is worse than none. It should be worn all the time except while lying down.

Ruptures are not free from serious danger if neglected. When a portion of bowel is pushed out through one or both of the "inguinal rings," or, a little lower down, in the "femoral" region, or at the navel, it may become swollen by gas, or by accumulation from constipation. This may

cause it to be *strangulated* at one of the rings or other outlets. The circulation of blood in the gut being thus stopped, the part outside may *mortify*, and this is, in most cases, the cause of the patient's death.

When a rupture threatens to be so choked or strangulated, it is of the utmost consequence for it to be at once *reduced*, if possible. *Gentle* pressure, to work it in again, as common sense suggests, and as *tact* may succeed in doing, is the need of the case. It will not do to be violent about it; that would make things worse. If it won't be coaxed in, then (if the doctor has not arrived and may not soon come) a *warm bath*, for twenty minutes, may be tried; manipulating carefully while the patient

FIG. 232.



Different forms of Self-adjusting Pads.

TRUSSES.

is in the bath. On coming out, let some one lift the patient's heels far above his head; and while he is so held, let another coax again at the rupture. Other measures will be most safely left for professional skill. If the protruded part will not go back, the last resort is a surgical operation; *nicking* the tight place at the neck of the tumor, so as to release it from the stricture and enable it to be returned. This may save life, but will not always be in time to prevent mortification, ending either in death or in recovery with an *artificial opening* at the place of rupture; an extremely annoying result, lasting through life unless itself relieved by subsequent surgical treatment.

Umbilical rupture in a newborn child is generally curable by early

treatment with a *compress,* acting like the pad of a truss. The compress may be made of soft rag of any kind, cut and folded so as to press steadily upon the part which protrudes at the navel. When rightly adjusted, it may be kept in place by adhesive-plasters, aided by a band, moderately tight, around the body. If the skin is irritable, the compress should be covered with simple cerate or vaseline when applied.

Scabies. *Itch.* See **Skin Diseases.**

Scald Head. *Ringworm.* See **Skin Diseases.**

Scarlatina; Scarlet Fever. With physicians, these mean the same thing. In popular language, the former term is sometimes applied only to the mildest attacks, with very little fever. The disease is contagious, and usually occurs but once in a lifetime; most generally during childhood. It is seldom, however, seen in infants under three months of age.

First symptoms of an attack of Scarlet Fever are, headache, weakness, and sore throat. Children may have vomiting; in severe cases, convulsions. The throat, on being examined, is of an intense red color. The tongue often looks like a ripe strawberry; red, with whitish spots over its surface. Heat of the body increases; the bowels are constipated; the pulse grows more rapid, and towards the end of the second day the red rash comes out. It begins commonly on the face, but soon spreads all over the body. It is very red; almost brick-red; the skin is swollen; there are no patches (as in measles); but, on looking closely, it is seen to be made up of tiny points or pimples, close together. The skin is hot and dry, and feels burning to the patient. Thirst is great; it is a condition of *high fever*. The throat becomes painfully sore and swollen, within and without. If all goes on pretty well, this state of things lasts with but little change for three or four days, and then gradually subsides through several days more. When the fever has quite gone, the outer skin begins to peel or scale off. Sometimes almost a whole finger-cover will come away at a time, like the finger of a glove.

After the beginning of convalescence, on slight exposure to cold, or even in some cases without this, the *kidneys* cease to act well, and *dropsy* comes on. This is shown by puffiness of the face and swelling of the legs and feet. Worse will be dropsy of the *chest* or of the *head;* of either of which patients may die. Even a mild attack of the fever has this danger left after it.

But Scarlet Fever, though recovered from in the large majority of cases, is far from being always mild; and it is especially uncertain all through its course. Besides the possibility of general exhaustion in feeble infants, there are two kinds of peril attending the attack. One is, of great severity of the *throat* inflammation. This may ulcerate, or suppurate, or may otherwise fairly worry out the patient's strength. If recovery comes, the disease may have reached the ears, leaving deafness behind it.

The other and greatest danger is, of what is called *malignancy* in the attack. A malignant case is generally a bad one from the start; but now and then it seems to take a sudden change for the worse. The rash does not come out, or, after appearing, it grows pale again. The

child is cold instead of feverish; its pulse flutters or almost disappears; or it becomes stupid, *comatose*, not capable of being roused. In the extremest cases, it is from the first like one stunned or struck by lightning, and may die within twelve or twenty-four hours.

Treatment of Scarlet Fever must be upon the recognized principle that we have no specific remedy with which to cut it short or "cure it." It has its course to run, and we are to get the patient through with as little damage as we can. A mild or average case requires little active treatment. A good dose of saline purgative medicine (always that, doctor?) at the start, or at least as soon as the fever becomes hot, will be an important thing. My father, who had an immense experience, during a large practice for fifty years, used to say that "many of the troubles towards the end of cases of Scarlet Fever and other allied diseases came from neglect of evacuating and depleting treatment at the beginning." By *evacuation* he meant purgation; by *depletion*, bleeding, or leeching to the throat. In my early practice (before 1860), I bled six children ill with Scarlet Fever. They all recovered beautifully. I gave up this practice, not from conviction, but simply in concession to the pressure in the medical profession against bloodletting, especially in such diseases. But early *purging* I do not give up; believing that, as a means not only of cooling fever but of *elimination* (getting rid of foul matter in the blood), it is of great consequence in all such disorders.

Further, for the *fever*, plenty of *cold water* to drink should be given. A part of it may be in the form of iced flaxseed lemonade. *Ice* itself will be very comfortable to the throat. Also, solution of citrate of potassium, with or without effervescence, a dose every two or three hours, as a cooling diaphoretic. (See **Remedies**, pages 565, 569.)

For the *throat*, the early use of something to act as an *alterative*, changing the *specific* inflammation to an *ordinary* sore throat, is reasonable. The old-fashioned gargle for that was of *cayenne pepper and vinegar* (hot for hot; coals to put out a fire!); it is not a bad prescription. Physicians oftener use solution of *nitrate of silver* (from four to ten grains to the ounce of water) applied with a camel's-hair pencil. I believe in the value of *early leeching* (American leeches) when there is much heat and swelling of the throat. If not, free *greasing* with lard (some people tie a solid piece of pork around the neck; rather heavy, I think) will do some good.

For the inflamed *skin*, the eruption, frequent sponging or otherwise gently bathing with *cold or cool water* will give the most relief. Lard, vaseline, and glycerin are also used for this purpose; but I believe cool water to be the best. The last thing at night, lard, tallow, or cold cream

may be rubbed over the face, arms, and legs, if the irritation of the skin is great.

What is to be done in *malignant* cases? If the attending physician agrees with my judgment, he will, if the rash does not come out, or "goes in" again, the skin being cool, and pale or dark-red, and the pulse weak, have the patient put into a *hot bath*, in which some salt has been dissolved. Then he will give, if the child can swallow, camphor, ammonia, Hoffmann's anodyne, or whisky (one or more of these), as quick *stimulants*, to bring about *reaction*, which gives the only hope of life. If *stupor* is present, the bowels, as is then apt to be the case, being unopened, he will give a strong cathartic, as jalap; with a diuretic, as squills. I am sure I saved the life of one child, comatose for thirty-six hours, by giving it powders containing each a grain of squills with three grains of jalap. Purgation followed, and the brain was relieved; after which there was no further trouble. This was rather large dosing, but the case was desperate. Not many recoveries from malignant Scarlet Fever take place, whichever form it assumes.

The *dropsy after* Scarlet Fever results from the poisonous effect of the disease on the *kidneys*. The urine, in such a case, is scanty and bloody; or at least tinged with blood. This is an unfavorable sign. Most physicians will apply either a mustard poultice or dry cups to the back, to draw blood from the congested kidneys. Of *diuretics*, to increase the flow of urine, digitalis and sweet spirit of nitre are then the most suitable. A warm bath, also, may assist to promote perspiration; the skin taking a part of the needful work of the kidneys during their oppression.

I have said that Scarlet Fever is contagious. There is no doubt of this; although it *misses taking*, in those exposed to it, oftener than measles or whooping-cough. It clings, however, a long time to rooms where patients have been sick with it; sometimes for months, unless much care has been taken to cleanse, ventilate, and disinfect everything. When the patient is well, say four weeks from the beginning of the attack, the peeling of the skin being pretty much over, let him have a daily warm (not hot) bath; in a warm room, and being quickly dried after it, to avoid the risk of taking cold. As soon as he can leave his room, let him wear clothing that was not in the room during the sickness. Let every article that was worn during the illness be *boiled* thoroughly (unless it be burned instead). Let the blankets be scoured, and hung all day in the sun and air, for two or three days. Carpets or mats in the room should be taken up and beaten, and then sunned and aired abundantly. Curtains or other hangings should be treated in a similar way; and lastly, sulphur should be burned in the room (everybody leaving it, the windows and doors being then shut) so as to fumigate and

disinfect the walls, ceiling, and floor thoroughly. Why so much trouble? Because, although nineteen cases in twenty of Scarlet Fever end in recovery, the twentieth may die, and they are all, as has been said, very uncertain. It is worth while taking a great deal more pains to avoid getting Scarlet Fever than it is measles or whooping-cough.

Sciatica. Pain, seated in the sciatic nerve; which runs along in the posterior central region of the lower extremity. See **Neuralgia.**

Sclerosis. Hardening of any tissue of the body from disease. It has been most carefully studied by physicians as it occurs in affections of the spinal marrow. Full account of it is given in all recent treatises on the Practice of Medicine; but it is too *pathological* a subject for this work.

Scorbutus. See **Scurvy.**

Scrivener's Palsy. Loss of power in the right hand from incessant use of the fingers in writing. Conveyancers, bookkeepers, reporters, etc., occasionally suffer from it. The cause being *exhaustion of certain muscles,* the treatment must be *total rest* of those muscles; to which may be added, the stimulus of pouring hot water over the forearm and hand, three or four times a day, for a few minutes at a time.

Scrofula. *Struma* of old medical books; King's Evil, formerly, in popular language. A superstition existed, even as late as the time of Charles II. of England, that the touch of a King's hand would cure this disease. Dr. Samuel Johnson, when a boy, was taken by his parents to get the benefit of this royal remedy.

Scrofula is hereditary in certain families. It is promoted by living in close houses, with insufficient clothing and poor food. But, once established, it may descend to children and grandchildren, even under comfortable circumstances. It is shown by sore eyes, sore nose, running at the ears, swollen glands of the neck, armpit, and groin, and disease of the bones of the arm or leg, or hip-joint complaint (coxalgia), or white-swelling of the knee; also, by a predisposition to scrofulous or tuberculous *meningitis,* a generally incurable affection of the brain. Not every scrofulous child has nearly all of these symptoms, but some of them may always be observed as indicating this "diathesis."

The *treatment* of Scrofula must be partly constitutional, and partly in adaptation to the local and special symptoms. Leaving the latter for the present, it may be said that the best possible surroundings and other conditions of healthy living are of the greatest importance towards getting rid of this taint of the system. Warm enough clothing, nourishing food (*milk* a staple, with cream and all), pure air, and out-of-door exercise, never carried to great fatigue. Of *medicines,* cod-liver oil, iodine, iron, and iodoform have shown the best reason for confidence in antag-

onizing the tendencies of Scrofula. It is so slow a thing in its progress, that there will always be time to obtain medical advice about it in every case.

Scurvy. Before Captain Cook sailed around the world, this was a common affliction of navigators, land explorers, especially in cold climates, and invading armies at a distance from their homes. This famous namesake of the "Tourist's Guide" of to-day found that the *lack of fresh vegetable food* caused Scurvy, and abundant confirmation of his discovery has been furnished since. Drs. Kane and Hayes suffered from it on their Arctic expeditions; the British and French troops in the Crimea, in their war against Russia; and many other examples of the same causation have been known in recent times.

Scurvy, when completely developed, has these characters: the mouth is sore, the gums being soft, swollen, tender, and bleeding easily; the legs are enlarged behind the knee, with a rather hard fibrous deposit there; the skin is blotched with red or purple blood deposits on the limbs, breast, or abdomen; appetite is lost, digestion is very poor; there is palpitation of the heart, with great general debility. Unless relieved, this goes on in a few weeks to a fatal end. Many cases occur, however, in which some only of these symptoms are present. The *mouth* soreness, which, when it exists, is very striking and peculiar, may be absent altogether. So it was with those remarkable cases (of which I saw a considerable number in an army hospital) brought home from McClellan's Peninsular campaign in Virginia in 1862. They had no swelling of the gums at all, but they had purple blotches on their bodies and limbs, were wasted almost to skeletons, and had scarcely any power of digestion left when they reached Philadelphia. Also, they all suffered with bad dysenteric diarrhœa.

Prevention of Scurvy is implied in what has just been said. No one can long preserve good health without, nearly every day, taking some food of vegetable origin. Scurvy is always liable to take place when some *fresh* vegetable food (or that which, in sealed cans, keeps some quality of freshness) is not taken at least every few days. Fatigue, exposure to cold, and worry, as homesickness or discouragement, *promote* the effect of this deficiency of diet. Nowadays, sea-captains, leaders of exploring expeditions, and military commanders, usually take much pains to keep or obtain supplies of potatoes, turnips, onions, or fruit, as oranges and lemons, to prevent their men when away from home from getting scurvy. Even desiccated (dried) potatoes have seemed to answer this purpose for some time. In the Arctic zone, fresh frozen meat has proved better than that which, even with ice, has been long kept.

Treatment of Scurvy is, *in toto*, essentially the application of the same

principle—furnishing an abundance of *fresh vegetable food.* We plied our men in hospital from the Army of the Potomac with lemonade, oranges, grapes, potatoes, etc.; articles which, with *ordinary* diarrhœa, would probably have finished them all. Most of them recovered; a few had no digestive or blood-making power left, and so wasted away and died within ten days or two weeks of their arrival from the field.

Sea-Sickness. A prize may well be offered for the discovery of a sure remedy for that! Having suffered from it nine out of ten weeks at sea, this is said by the author feelingly. There is no need of a description of this malady; the word *nausea* comes right from it in the Greek. *Medicines* for Sea-sickness I have not tried, unless *mineral water* (carbonic acid water, "soda" water) be called such. This, a little at a time, with *ice,* helped me considerably. I doubt whether anything else is better.

Advisers on ship-board differ on the question whether one should "give up" to Sea-sickness, or stand up and fight it out. There was no such question with me. Down I must go; and I advise every victim of sea-sickness to lie down till he is better. It is true, *fresh air* is very reviving; and the air on deck is much better than down below; but to obtain benefit from it, one should be wrapped warmly, carried up, and laid down on the deck.

Of drugs, cocaine, chloral, and bromide of potassium have had the recommendation recently of some physicians. Also, Dr. John Chapman's *ice-bags to the spine* have obtained a measure of reputation for this complaint. But it continues yet to be, like boils and hydrophobia, an "opprobrium" of the medical profession.

Seat-Worms. See **Worms,** and **Santonin,** p. 605.

Septæmia; Septicæmia. Though the shorter of these words was earliest proposed, the longer term is still the most used. It means *tainting of the blood by products of decay.* *Sepsis* is organic decomposition, putrefaction; an antiseptic is something which prevents or retards such changes.

In the greatest number of cases, at least, under observation, the septic matter enters the blood by *absorption* from a part of the body, at or near the surface, in which decay is going on at the time. A wound not healing well; an abscess, not timely emptied of its discharge; the strained and partly torn tissues of a mother, shortly after the delivery of her child, in contact with which decomposing material is left: these are examples of the origination of Septicæmia. How does it differ from *pyæmia?* In my judgment, the *symptoms* are essentially the same, except that in the latter pus is conveyed and deposited in different places in the body, forming a number of abscesses; which, in simple Septicæmia, do not occur. President Garfield, therefore, we say, died *with*

(hardly *of*, for his wound was mortal *in any event*) pyæmia. This, I would say, is Septicæmia *plus* the formation of local deposits of pus.

Symptoms of Septicæmia are, repeated chills; fever, with a very rapid but feeble pulse; vomiting; delirium; great debility; cold sweats; sometimes swelling of the larger joints. *Treatment* of it (having no special remedy to confide in) we may leave to the physicians; remarking merely, that the *purest air* possible is both preventive of and, if anything can be, helpful in Septicæmia; that concentrated liquid food, a little and often, by the bowel if the stomach cannot accept it, is appropriate; and that quinine, ammonia, and careful alcoholic stimulation are reasonably given with a view to supporting the sadly flickering flame of life.

Shaking Palsy. *Paralysis Agitans.* See **Paralysis.**

Shingles. *Herpes Zoster.* See **Skin Diseases.**

Ship Fever. See **Typhus Fever.**

Sick Headache. See **Headache.**

Skin Diseases. A full account of these might occupy a volume larger than this. Some definitions will be in place here, with general principles of management, and brief particular mention of those affections of the Skin likely to be met with in household experience.

Of various *classifications* of Skin Diseases I prefer this:

Exanthemata, *rashes:* Erythema, Urticaria, Roseola.

Papulæ, *pimples:* Lichen, Strophulus.

Vesiculæ, *watery eruptions:* Eczema, Herpes, Pemphigus, Rupia.

Pustulæ, *pustules:* Ecthyma, Impetigo,

Squamæ, *scaly diseases:* Lepra, Psoriasis, Leprosy, Pityriasis, Pellagra, Ichthyosis.

Maculæ, *spots:* Ephelis, Vitiligo, Chloasma.

Hypertrophiæ, *growths:* Nævus, Clavus, Verruca, Elephantiasis of the Arabs, Scleroderma.

Tubercula, *tubercles:* Acne, Molluscum, Lupus, Elephantiasis of the Greeks, Frambœsia, Keloid.

Hemorrhagiæ, *blood-deposits;* Purpura.

Neuroses, *nervous* affections of the Skin: Prurigo, Anæsthesia, Neuralgia.

Parasiticæ, *parasitic* diseases: Itch, Sycosis, Tinea, Pityriasis Versicolor, Plica Polonica.

Syphilida, *syphilitic* affections of the Skin.

Erythema is a common and not serious inflammation of the skin, of which a fair example is seen in "chapped" hands. This is prevented by always wiping the hands quickly and thoroughly dry in cold weather, after they have been in water. *Cure* of chapped hands

or face is effected by greasing them well and often with tallow, cold cream, or simple cerate. The same principle of treatment applies to other forms of Erythema; as that of infants' loins, etc., from want of carefulness in their daily toilet, and *frost-bite* (which see).

Urticaria is Nettle-Rash. Its eruption is in long or round red lumps or "wheals," which sometimes come and go within a few hours, and while they are present burn and sting very unpleasantly. *Indigestion* is the most common provoking cause of Nettle-Rash. It lasts usually a week or two. *Treatment,* a dose of magnesia; light, cool, simple diet; starch-powder dusted on the wheals; wash with moderately cold vinegar and water, or glycerin and rose-water; oxide of zinc ointment, etc.

Roseola is a damask-red eruption, in irregular patches, on the body and limbs; without fever, and lasting usually but a few days. It has no relationship to scarlet fever, nor to rötheln or German measles; although this last disorder is sometimes miscalled Roseola, even by physicians. This rash requires no treatment except what is suggested by the general state of the patient's system.

Strophulus is the "red gum," or small-pimply, red rash of early infancy. Starch or arrowroot powder and oxide of zinc ointment will be suitable in its treatment.

Lichen is the name for numerous small pimples on patients of any age. A mild form of it is *sunburn, Lichen Tropicus.* This may be treated like erythema or strophulus, as above mentioned.

Lichen Agrius is generally the result of neglected simple ordinary Lichen. It may scab, crack, run, and be very troublesome. The patient may need to be kept in bed, with poultices of bread or flaxseed to clean the sore parts, and then lime-water and oil dressing, followed afterwards by simple cerate, to heal them. It is generally worst on the legs and feet, or hands.

Eczema is now considered by physicians to take either, or successively all, the forms of eruption, pimples, water-blisters, pustules, and crusts or scabs; but through all its characteristic is that of an *effusive* inflammation of the skin. Its vesicles (water-blisters) are smaller than those of *Herpes. Both* of these are often, in popular language, called *Tetter.*

Herpes has larger water-blisters, though still not very large. *Fever-blisters* around the mouth are an example of Herpes. *Shingles, Herpes Zoster,* is a very curious but not common disease, in which a zone or girdle of inflamed vesicles goes half round the body at the waist, generally on the right side. Neuralgic pains attend this. It generally lasts but a week or two.

Herpes Circinatus is non-contagious ringworm. It is known from

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Tinea Tonsurans, contagious ringworm, by having a great number of minute vesicles around the margin of the rings or round patches of which it consists.

Treatment of Eczema requires skill in the management of each case. Get a doctor to attend to it; sometimes it becomes chronic and tedious.

Milk Crust of infants (Crusta Lactea) is an example of it. The *condition of the patient* must be attended to; the *stomach*, the *bowels*, overfulness of *blood* or the reverse (anæmia). *Clothing* must not be too heavy, and must be changed often. *Rooms* must not be allowed to be hot and close. *Food* should be light and not rich (*i. e.*, oily, fatty); easily digestible. If Eczema proves obstinate, *arsenic* is often prescribed for it; Fowler's solution (*liquor potassii arsenitis*), three drops at first, twice daily, increased two drops a day until ten drops twice daily are reached, interrupting its use if the patient has *headache, sick stomach, diarrhœa*, or *puffiness of the face.* Applications to the eczematous *eruption* may be: lime-water and oil; bran tea; flaxseed tea with soda in it; glycerin and rose-water (one part to four or five); etc. When *chronic*, some physicians keep the parts covered constantly (except daily washing with Castile soap, or lime-water) with light *rubber-cloth.* Others use *adhesive-plaster* all over it, with the same view of keeping out the air.

Treatment of Fever-blisters (*Herpes Labialis*) about the lips may be by dusting with *magnesia* or applying *cologne-water* at the start, and afterwards, if they continue to return, *calomel ointment* (half a drachm of calomel to the ounce of cold cream).

Shingles may be treated with *benzoated oxide of zinc* ointment; to which, if there is much pain, opium may be added (five or ten grains to the ounce).

Ringworm (scald-head) of either variety will generally be cured by two or three applications of *tar ointment* at night (covering the part with a soft rag, and over that oiled silk or rubber-cloth), washed off in the morning with Castile soap and water.

Ecthyma consists of a few large pustules; *Impetigo* of a variable number of small pustules, scattered or in groups. In *treatment* of both of these, a good medicine early in the case will be *wine of colchicum root* ten drops, with *wine of ipecac.* as much, in water, three times a day (adult dose) for several days. If obstinate, *arsenic* will be in place, as for chronic Eczema. Arsenic is the heroic *alterative* in all continued Skin Diseases. With care, it may always be prevented from doing harm. For this, the rules are: 1. Begin with not more than three drops twice daily, watching the effects. 2. Never go beyond ten drops twice daily. 3. Stop it at once for a week, if either headache, sick

stomach, diarrhœa, or puffiness (œdema) of the face appears. 4. Interrupt it for several days, in any case, after it has been taken continuously for as much as three weeks.

Lepra and *Psoriasis* are patchy and scaly chronic diseases of the skin, the principles of whose management are the same as those just set forth; but they are so hard to cure that any special application or variation of those principles had better be left to the judgment of a professional adviser.

Leprosy has had an interesting history, from the days of the Old and New Testaments down through the Middle Ages in Europe to our own times. But as there were, in 1880, less than one hundred lepers in the United States, this disease is not likely to invade the households of any of our readers; we may, therefore, refer upon it to professional works. (See "Essentials of Practical Medicine," fifth edition, p. 545.)

Pityriasis is *dandruff.* Multitudes of small white scales form, especially on the scalp of the head. This is generally cured (not at once, however) by keeping the hair short, and washing it well every day with Castile soap and cold water. If it lingers, a good wash will be Cologne water, half-and-half with water, to which one-fourth as much glycerin is added; or hot vinegar and water; or tannin (tannic acid) ten grains, glycerin a fluidounce, whisky and water each a fluidounce, well shaken together, and applied every night with a large camel's-hair pencil, followed by Castile soap and water in the morning.

Pellagra is an often fatal disease of Southern Europe (especially Italy), with drying, thickening, and scaling of the skin. It has never been seen native in this country.

Ichthyosis, fish-skin disease, is well described by its name. It is *rare,* mostly *congenital* (born with a person), sometimes *hereditary,* and, as a rule, *incurable.* I have only seen one case of it, and am not likely to see another.

Ephelis is *Sunburn.* Only when intense from continued exposure to the direct rays of a hot sun, is this of any consequence. I have known a few persons of delicate skin, on the sea-shore for example, to suffer so much from glare and inflammation of the skin, as to be almost ill with it. One so affected must keep in a cool room in the house, on slop diet, drink cool lemonade, and cool the *head* at least, with ice-water often. On the face, arms, etc., starch-powder dusting, and cold-cream the last thing at night, will allay the irritation in a day or two.

Freckles are generally not admired, that is all. Can they be taken out? Not with certainty. If anything will have that effect, I believe it may be hoped from pencilling each freckle several times a day with either nitromuriatic acid solution (ten drops to a wineglassful of water)

or solution of Labarraque's chlorinated soda (two teaspoonfuls in a wineglassful of water).

Vitiligo is *veal-skin;* unnatural whiteness of the skin. If it comes on the head, the hair falls out; *Alopecia*, baldness. (See **Hygiene**, Care of the Hair.) It is, if curable, so only with difficulty, there being no specific remedy for it.

Chloasma is a name for more extended spots than those which we call freckles, being, like them, yellowish or brownish-yellow in hue. If any treatment will change them, it is likely to be that above mentioned for freckles.

Nævus is a *Mole*. See **Moles**. *Clavus* is a Corn; *Verruca*, a *Wart*. See **Corns** and **Warts**.

Elephantiasis of the Arabs is also often called Barbadoes Leg (*Bucnemia Tropica*). It consists in an enormous growth of the connective tissue and skin, of the legs, and sometimes the trunk of the body and the neck; so that the legs and feet, particularly, become *elephant-like* indeed. It is a thing of slow progress, but is seldom cured. The only treatment which has seemed capable of stopping the growth is *tying a large artery* which supplies blood to the morbidly enlarged and enlarging parts.

FIG. 233.

ELEPHANTIASIS OF THE ARABS.

Acne is a common kind of large-pimpled eruption, especially on the face. The pimples include "sebaceous follicles" (little grease-forming glands) in which their secretion is detained. *Acne Rosacea* is the form seen on the face; so called because of the redness of the pimple and of its environs. Often (not always) in each follicle there is a parasitic *animalcule*, *acarus* (or *demodex*) *folliculorum*, seen with a magnifying-glass in groups, each one-fiftieth of an inch in length. What may sometimes be taken for a parasite is a *comedo;* that is, a solid spot of sebaceous matter, in a follicle, which looks like a black dot, and can be squeezed out. An easy way of doing this is to push down over it the barrel of a watch-key. If Acne pimples *pustulate* (fill with yellow

matter), when ripe, they may be punctured with a needle, *sidewise*, to let the matter out.

The other *Tubercular* affections named in our list, *Molluscum, Lupus,* etc., are not common enough to be appropriately considered in any but a professional work.

Of *Hemorrhagic* affections of the skin, except that which is symptomatic of *Scurvy,* the only one is *Purpura.* See **Purpura**, and **Scurvy.**

Prurigo is persistent *itching,* without the specific cause (to be referred to presently) of Scabies or Itch. (*Pruritus* is the *symptom* of itching, merely.) Old people are particularly apt to suffer from this. There is often no eruption, until one is brought out by scratching; which is almost unavoidable in the effort to obtain relief. Itching of the fundament (*pruritus ani*) is mostly caused by *seat-worms.* When this is so, they should be got rid of. (See page 605.) *Treatment* of Prurigo includes attention to the state of the stomach, bowels, and general system. Local remedies may be many, but not unfrequently disappointing, at least as to producing permanent cure. Still, they are generally much better than perpetual scratching, which increases the irritation in the end. Among such remedies are: cold water; hot water; flaxseed-tea, with soda in it; *lathering with Castile soap water, with a shaving-brush;* strong salt-water; whisky and salt-water; pure whisky; vinegar; creasote ointment; cerate of white lead (two drachms of carbonate of lead to an ounce of simple cerate); laudanum; spirits of camphor; camphor and hydrate of chloral, equal parts; glycerin; olive or almond oil; benzoated vaseline; boroglyceride; infusion of tobacco; etc., etc.

Anæsthesia is loss of sensibility. It almost never occurs from disease except as a symptom of *paralysis* or of *leprosy.*

Neuralgia of the skin is not common. When it does occur, it is a part only (as a rule) of a more extended affection of the same kind. (See **Neuralgia.**)

Parasitic diseases of the skin are, with good reason, believed to depend on the presence of either an animal or a vegetable organism. The only *animal* cause of this kind on the human skin is the *sarcoptes* (*acarus*), which is the cause of *Scabies* or *Itch.* This disease is communicated from person to person, by the migration of the tiny *acari.* It appears as an eruption of small vesicles on a red surface, chiefly between the fingers and on the back of the hand; next often on the arms, legs, abdomen, or scalp. It does *itch* terribly; worst at night. King James II. is the only person ever known to say that he enjoyed it. On looking closely with a magnifying-glass, a little *line* may be seen going from almost any one of the vesicles; this is the track or burrow of the animalcule, *Sarcoptes Hominis;* one of the *Arachnida*—tenth cousin to the

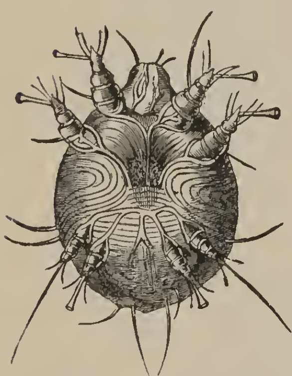
Spider—a flat-bellied, round-backed, tortoise-shaped, eight-legged little pest.

Treatment of Itch is simple. Several *parasiticides* will cure it; but sulphur is counted, on the whole, the best. The patient should take a warm bath, washing head and all well with soap; and then, at bedtime, rub the whole eruption over with *sulphur ointment*. Two or three applications, with subsequent care with the clothing, as to cleanliness, etc., will usually effect the cure.

Sycosis is Barber's Itch. It may be caught by being shaved with a razor just used on the face of a man having the disease. With a microscope, its causative vegetative parasite may be seen; called *tricophyton mentagrophytes* by scientific writers.

Tinea is *contagious Ringworm*. In it, if there are any little vesicles, they are very few; in the non-contagious kind (Herpes Circinatus), though small, they are numerous. In the two varieties of Tinea two parasitic vegetations are seen with the microscope; a *tricophyton* and a *microsporon: Favus* or *Porrigo* is another analogous affection.

Fig. 234.



MALE ITCH ANIMALCULE.

Fig. 235.

MICROSCOPIC VEGETATION OF A SKIN DISEASE.

Tar-ointment, applied at night, after the hair has been cut very short and the head cleansed, and washed off with Castile soap and warm water in the morning, will generally cure it. Still more powerful parasiticide applications are: mercurial ointment; solution of corrosive sublimate (both of these require much caution, the latter especially, as a *poison*); sulphurous acid solution; creasote or carbolic acid in solution or ointment; etc.

Syphilitic affections of the Skin will be alluded to under Syphilis.

Sleep-Walking. See Somnambulism.

Small-Pox. *Variola* is the technical name of this very contagious and often fatal disease; which, before the time of vaccination, slew tens of thousands every year in Europe and America, and left its deforming marks on the faces of very many of those who survived its attacks.

Symptoms. About twelve days after exposure to the contagion, sickness begins with languor, headache, severe pain in the back, often vomiting; soon followed by fever. On the third day of this, pimples, at first small and red, appear on the face, neck, arms, trunk, and lower limbs. The pimples go on to become vesicles (water-blisters), and then fill with yellow matter and become pustules; this change being complete by the ninth day of the fever. Next, they flatten and scab. Four or five days later, about the fourteenth day of the fever, the scabs begin to fall off; all being off usually by the end of the third week of the attack.

The severity of Small-pox depends in each case chiefly on the amount of the eruption. When the pustules are so close together as to run almost together, it is called *confluent* Small-pox. The danger of an attack may be increased by the eruption invading the throat. I knew of one case made fatal by this, through interference with breathing and swallowing. *Malignant* cases sometimes are seen; when, as in malignant scarlet fever, the poison-cause of the disease prostrates the patient almost or quite from the first. In such cases, the eruption either does not come out well, or takes on a dark or livid color; with a tendency to coldness of the skin, a small and feeble pulse, and extreme debility. Blindness and deafness are among the possible consequences of an attack of Small-pox; besides the "pitting" or pock-marking of the face, which is the rule rather than the exception. Like scarlet fever, measles, and hooping-cough, Small-pox generally occurs but once in a lifetime. Yet instances are well known of a second attack; Louis XV. of France is said to have died of such; I knew of a fatal example also of it in Philadelphia some years ago.

Treatment of Small-pox is not specific, as we have no antidote for its cause. Care should be taken that the bowels are well opened early in the attack, and are not constipated afterwards. For the fever, cooling medicines are suitable, to promote perspiration; as citrate of potassium or acetate of ammonium in solution. Plenty of cold water, or lemonade, may be drunk. The food must be liquid, but nourishing, and given often, in small quantities: milk, chicken-broth, beef-tea, etc.

To prevent *pitting* on the face is worth considerable pains. The best way will be to abort (kill) the worst of the papules, on their second day, by touching each one in its centre with a small pointed stick of nitrate of silver. Then poultice the face with flaxseed meal, until all the pus-

tules flatten out; and, lastly, paint the whole face thickly with *collodion*, to which one-fiftieth part of glycerin has been added. This will protect the eruption from the air, and promote healing with as little of marks as possible.

Varioloid is Small-pox *modified by vaccination*. (See **Vaccination.**) It resembles the original disease in its whole history; but is less severe, and very seldom fatal. It goes through its stages sooner, and with less fever. *Pitting* does not often result from it; blindness or deafness never. Its treatment is the same in principle as that of Small-pox; according to the symptoms and the condition of the patient.

No disease is more contagious (catching) than Small-pox and Varioloid; and an unprotected person may take the disease in its severest form from the mildest case of either. Protection is afforded, almost infallibly, by *vaccination* and *revaccination* (see **Vaccination**). But, since all persons are not certain to be thus protected, great care must be taken to lessen as much as possible the chances of contagion. In cities, special hospitals are, very properly, provided for such diseases. When a case is treated in a private house, the patient should be *isolated* as far as can be, from all others except needful care-takers. Upon his recovery, all garments and bed-clothing used during the attack had better be *burned*. Next best will be, thorough boiling, followed by long exposure to air and sunshine. A person who has had Small-pox ought, when the scabbing process has been completed, to take a warm bath (in a warm room) two or three days in succession, to clear the skin; and then should not be allowed to mingle with others, a child, for example, to go to school, within forty days from the beginning of the attack.

Snake-Bites. See **Accidents** and **Injuries,** later in the book.

Somnambulism. Sleep-walking. The general nature of this was spoken of under **Physiology,** when considering the functions of the brain and nervous system. A part of the brain (chiefly the *sensori-motor* centres) is awake; the rest asleep. The sleep-walker moves about with his eyes open; sometimes going upon or into dangerous places, which, when awake, he would have shrunk from. At such times, it is dangerous to waken him suddenly; his alarm might cause a catastrophe. Children, or at least young persons, are much more apt to be somnambulists than grown people. Sleep-*talking*, moreover, is more common than sleep-*walking*. A few will hold a conversation with another when in that state.

To prevent somnambulism, a strong impression of its inconvenience and danger, made upon the mind, will most often take effect. When this is not so, the sleep-walker should not be left to sleep alone, and should be roused by his companion as soon as he begins to move. In some in-

stances, fastening the great toe to a bed-post by a cord has been found effectual.

Sore Throat. See **Throat, Sore.**

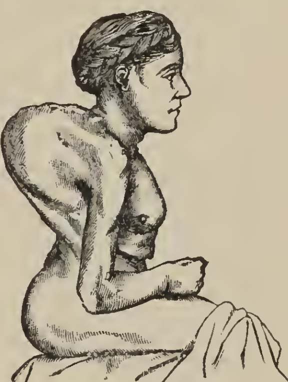
Spine, Diseases of. The bony spine (vertebral column) is subject to *caries;* a slow inflammation, followed by decay of the bone; especially in the middle of the back (*dorsal vertebræ*), in scrofulous children. The patient stoops from weakness of the back; and at last becomes *hump-backed.* When the disease passes off, this deformity remains.

In the *treatment* of this affection, the favorite improvement of latter times is a contrivance for taking the weight of the upper part of the body from the diseased *vertebræ* (separate bones of the spinal column; see **Anatomy**). This is done by suspending the whole body to a framework above it, by means of bands raising it by the armpits and head; and, while it is thus held up, the spine being moderately extended, a

Fig. 236.

SPINE DISEASE.

Fig. 237.



CURVED SPINE.

jacket is made, of bandages soaked in plaster of Paris, or of porous felt, so fitted to the body as to keep it in the extended position, after it is taken out of the suspending frame. By this relief from pressure upon the bodies of the inflamed *vertebræ,* their chance of recovery without damage is much helped; and also the tendency to humpbacked deformity is greatly lessened. Much skill is needed in this treatment.

Spinal Irritation is an affection chiefly of the spinal marrow; but accompanied, as a sign or symptom, by tenderness on pressure in some part of the middle of the back. Other symptoms are, pains in the back, chest, stomach, and sides; sometimes indigestion, palpitation of the heart, nervousness, weakness; in some cases spasms of certain muscles, or even general convulsions. Patients so affected are generally *pale* and *anæmic* (thin-blooded). In *treatment,* they are likely to require

iron, perhaps *cod-liver oil*, salt-baths, and country air, to build them up. Also, advantage may be expected from *counter-irritation* along the back; by dry cups, painting with tincture of iodine, warming-plasters, etc.

Some other affections of the spinal marrow have been already considered. See **Locomotor Ataxy**, and **Paralysis.** *Fracture* of the Spine will be spoken of under **Accidents** and **Injuries**, near the end of the book.

Spitting Blood. See **Hemorrhage.**

Spleen, Enlargement of. Although met with also in typhoid fever, and some other diseases, this is most remarkable in prolonged cases of *Intermittent Fever* (Ague). In that affection, the Spleen sometimes gets to be four, five, or more times as large as is natural. When the "chills" are cured, it generally goes down; but not always entirely so.

Spotted Fever. See **Cerebro-Spinal Fever.**

Sprue. See **Thrush**, under **Mouth, Sore.**

Stammering or *Stuttering*. An annoying impediment of speech, which some persons have from the time of their first learning to talk. It is owing to a *want of control* over the muscles of speech; and is a *nervous* affection. It can almost always be cured by patient perseverance in *vocal gymnastics*. A simple method of self-training for this purpose is, to read or recite often, at first alone, and afterwards in company with others, in a deliberate, measured way; taking each syllable by itself, as in chanting or singing. Thus: "Will-iam Penn was the found-er of Penn-syl-va-ni-a; He-rod-o-tus was an an-cient Gre-cian his-to-ri-an." By holding on, so to speak, to each syllable until ready to bring out the next, practice gradually but greatly increases the control of the will over the speech.

Stomach, *Inflammation* of: see **Gastritis.** *Cancer* of: see **Cancer.** *Cramp* of: see **Colic. Ulcer** of the Stomach may be here briefly referred to. It is a rather uncommon affection, least rare in feeble women, between twenty and forty years of age. Its symptoms are, sharp pain in one spot of the stomach, with or without tenderness or pressure, but increased by eating, and especially by eating *sugar;* also, vomiting; a little blood being brought up. Sometimes, there is real and serious hemorrhage; *hæmatemesis.* A very bad ending of an Ulcer of the Stomach is for it to perforate the walls of the stomach, allowing its contents to get into the peritoneal cavity. This is always followed by death within a few days. The above symptoms are much like those of *cancer* of the stomach; but, in the latter, the pain is less limited to one spot, and is not in so marked a degree increased by any kind of food. By aid of the microscope, also, the matter vomited will show

cancerous particles present; and, generally, a *tumor* can be felt upon careful examination if the disease is cancerous.

Treatment of Ulcer of the Stomach includes the use of soft food, as arrowroot made with milk, chicken-broth with rice, limewater and milk, etc. As medicines, nitrate of silver, creasote, and iodoform are most worthy of trial. Opium may be called for on account of the pain; or hypodermic injection of solution of morphia; but it is safest to withhold these as long and far as practicable, on account of the danger of the *opium or morphia habit.* It will promote the cure of the ulcer, for a considerable part of the nourishment for a time to be given by injections (beef-tea, egg, milk, etc.) into the bowels.

Stone in the Bladder. *Calculus.* The stone really forms almost always at first in the kidney; but after passing into the bladder, if

FIG. 238.

URIC ACID STONE.

FIG. 239.

MULBERRY CALCULUS.

detained there, it may gradually increase very much in size. There are stones of several different materials: *uric acid* (the commonest), *phosphates, oxalate of calcium,* etc.

Symptoms of Stone are, pain in the bladder, and beyond it in the male; sudden stoppage of the stream while urinating; distress on taking active exercise of any kind; bloody urine; feverishness, and wasting of the strength. Certainty as to the existence of a stone is obtained by examining the bladder with an instrument.

Treatment of Stone is, besides care to avoid anything to increase the irritation of the bladder due to its presence, an operation for its removal. This was formerly done by cutting into the bladder and drawing out the stone with forceps. That operation is still sometimes preferred; but a

procedure lately growing more into favor is *crushing* the stone by an instrument introduced through the urethra, and then washing out the fragments. It is a serious operation, only to be done for the relief of very distressing symptoms.

Strabismus. *Squinting; Cross-eyes.* This results from the muscles which draw the eyes in one direction being stronger than those which move them in the opposite direction. Double sight is the consequence, as the axes of the two eyes do not then meet in an object looked at. But, by habit, the cross-eyed person comes to attend only to one of the two images seen, and so is not greatly incommoded by it. For the sake of appearance, an operation is often performed for the cure of Strabismus; *dividing*, with a small sharp knife, the stronger muscle, so as to give the other opportunity to keep the balance with it in moving the eyeball.

This operation, never giving much pain (being done in so short a time) may be rendered quite painless by the recently introduced use of *hydrochlorate of cocaine;* a few drops of a two or four per cent. solution of which render the eye for a time insensitive to the touch, and even to the knife. Considerable skill, however, is required to make such operations successful.

In children, habitual squinting is occasionally brought on by a habit of producing it just for amusement; or by looking a great deal at a hat or bonnet-string dangling between the eyes. Such things should be carefully avoided.

Strangury. Difficulty or pain in emptying the bladder of urine. It is not often met with (except when there is stone, or gravel, inflammation of the bladder, or stricture of the urethra) unless after a *fly-blister*, or when *cantharides* (Spanish fly) has been taken as a medicine. For the relief of Strangury, camphor or assafœtida may be taken; warm cloths (wrung out of hot water) may be applied over the bladder and *perineum* (the crotch, in front of the *anus*, between the thighs); a warm bath or hip-bath may be used; and, in a severe case, an injection into the bowel of thirty or forty drops of laudanum, with starch, by means of a small syringe. A few drops of spirits of camphor on the surface of a blister will generally prevent it from causing strangury.

Struma. See **Scrofula.**

Stye. A small, but often painful, inflammation of one or more of the small glands or follicles at the edge of the eyelid. It becomes red, swollen, and tender to the touch; in a day or two, if not relieved, it may suppurate; getting well after the yellow matter has been discharged.

To *arrest* the inflammation of a Stye, in its forming stage, a small piece of ice, frequently applied, will be the best thing. If that cannot

be had, some other cold thing, as a steel key, may do. When not checked at the start, no other treatment is worth while, unless it be severe enough for the application of a bread and hot-water poultice at night.

St. Vitus's Dance. See **Chorea.**

Summer Catarrh. See **Asthma.**

Summer Complaint. See **Cholera Infantum.**

Sun-Stroke. See **Heat-Stroke.**

Syncope. See **Fainting.**

Syphilis. A disease, primarily contagious, originating in vicious,

FIG. 240.

SYPHILITIC TEETH.

unchaste living; at first local, afterwards constitutional; and in that form hereditary. Among its manifestations are, copper-colored eruptions of several kinds; ulcerated sore throat; inflammation of the iris of the eye; loss of the hair; rheumatic pains and swellings of the bones; and degenerative disorders of the brain, lungs, liver, spleen, etc. It is mostly curable, especially by early treatment; but is sometimes obstinate. Principal remedies in its management are the preparations of mercury (calomel, blue mass, iodide of mercury, corrosive sublimate), and iodide of potassium. For a more particular account of Syphilis, see special works on Medicine and Surgery.

Any one who has seen, in a hospital or elsewhere, the victims of venereal or syphilitic disease, may well have a horror of the danger which belongs to prostitution. Ugly red lumps scattered over the face, ulcerated open sores in the throat, painful swellings on the bones, and often very serious diseases of the brain, lungs, or other vital organs make life miserable; and, perhaps worst of all, if a syphilitic person has children, they may inherit the same disease, innocent sufferers from their parent's vice. (See page 370 on "the social evil.")

Tabes Dorsalis. See **Locomotor Ataxy.**

Tænia. *Tape-Worm.* See **Worms.**

Tetanus. *Lock-jaw.* An affection centring in the *spinal marrow*, and produced in most instances by the irritation conveyed by nerves from a wound; sometimes, however, it is brought on by exposure to cold, or cold and wet. *Punctured* wounds, as by a nail or pitchfork in the hand or foot, or extensive *crushing* of parts, as in railroad accidents, are especially liable to be followed by Tetanus. *Symptomatic* of it is stiffness of the muscles; first of the jaws, which are firmly closed, and cannot be opened without external force; afterwards, in marked cases, in all the muscles of the body. Sometimes the body is arched backward (opisthotonos); in other cases forward (emprosthotonos). Food cannot be swallowed; the patient is sleepless; and, unless relieved, he will die within a week or ten days. More than three-fourths of those attacked with Tetanus die. The danger is least when it comes from exposure to cold; greatest in *traumatic* cases (originating from wounds or injuries).

Treatment of Tetanus requires *absolute* **quiet**; in a room nearly darkened, and all *noises* shut out or prohibited in and near the room. Prolonged warm or hot baths are likely to be beneficial. If obliged to wait for medical advice, the only medicine I can suggest using to save time is *opium*, in the form of laudanum or solution of morphia. Pretty large doses of opiates are often given by physicians in Tetanus. I saw two recoveries under doses of a grain of opium (about twenty-five drops of laudanum) every two hours for three or four days and nights; also a tablespoonful of whisky every two or three hours. Milk and essence of beef are the most available kinds of nourishment for such cases. Sometimes it is necessary to gently pry open the jaws and insert a cork on each side, to leave room for a tube for the introduction of food into the mouth; or one or two teeth may have to be drawn for the same purpose.

Tetanus or Trismus of the new-born babe is a very often fatal disease, particularly common among the negroes of the Southern States. Two causes are believed to produce it, at least in children predisposed to nervous disorders: pressure of the bones of the head (which are movable at birth) upon the brain, during or after delivery, and irritation of the navel, where the umbilical cord has been separated. The former is probably most often concerned in the matter. To *prevent* the tendency to it, labor should not, avoidably, be allowed to linger for many hours; and, as soon as the child is born, it should be laid on its side (the right side), so that *no pressure* can act upon the *back* of the head (occipital bone). *Treatment* of *Trismus Nascentium* (of the new-born) had better be left altogether to professional judgment.

Tetter. A popular name for both **Eczema** and **Herpes.** See **Skin Diseases.**

Throat, Sore. Common Sore Throat is an inflammation of the *fauces* (entrance to the throat) and *pharynx* (first portion of the swallowing throat or gullet). Everybody knows the symptoms. When looked at, opening the mouth wide and pressing the tongue down with a paper-cutter or the handle of a spoon, redness and swelling may be seen. Pain on swallowing is a leading feature of the case; sometimes there is constant aching. If the tonsils, or one of them, be most affected, it is *tonsillitis* or *quinsy* (which see). *Ulcers* sometimes form, and can be seen when looked for as above said. In *diphtheria*, besides redness and swelling, there is a whitish, grayish, yellowish or brownish deposit of false membrane on or near one or both of the tonsils, which often spreads, even into the larynx (upper windpipe) and trachea. When looking for such deposits, let the patient's throat be first well washed out with a gargle; lest a portion of *mucus* (phlegm) remaining at the moment, but easily removed, be mistaken for diphtheritic pseudo-membranous deposit. Never suppose a sore throat to be diphtheria, without good and clear evidence; much the largest number of cases of sore throat are not diphtheria. In scarlet fever, also, soreness of the throat is a general and prominent symptom. Ulcerated Sore Throat is common in secondary syphilis; and it sometimes occurs in the course of pulmonary consumption.

Treatment of ordinary sore throat (acute pharyngitis) is simple in principle. A dose of cooling cathartic medicine, as citrate of magnesium, Tarrant's aperient or Rochelle salts; flaxseed lemonade to drink, a little, slowly, and often; alum-water, or tincture of myrrh and water, or hot green or black tea, to gargle the throat; bathing the throat outside with soap liniment, to which ammonia has been added, or with sweet oil and ammonia, equal parts; a hot mustard foot-bath at night, the first night, and afterwards also if there is any coldness of the feet; these are about all that need be done as a general rule. (See **Inhalation**, p. 577.)

Ulcerated Sore Throat needs, when *not syphilitic* in origin, touching of the ulcer or ulcers with either the solid stick of nitrate of silver (lunar caustic), or a solution of it (ten to twenty grains in an ounce of water); also, applying powder of iodoform, a little daily, on a slightly wet camel's-hair pencil. If it be *syphilitic*, the constitutional affection requires iodide of potassium (five to ten grains three times a day), besides similar applications to the ulcers in the throat.

Chronic Sore Throat calls for astringent gargles (alum, myrrh, tannic acid) to be persevered in; also touching the throat with nitrate of silver solution (four to ten grains in an ounce of water) every day or two; and

bathing outside with spirits of turpentine diluted with sweet-oil (a quite heating application); or, in an *obstinate* case, rubbing three or four drops of croton-oil over a limited space on the front of the throat; taking great care not to get any of the oil into the eyes. This will cause a small pimply or pustular eruption to break out, which lasts a few days, and affords a powerful counter-irritation.

Thrombosis. Formation of a clot in a vein, which obstructs the movement of blood in it.

Thrush. *Sprue* is another name for this. See **Mouth, Sore.**

Thyro-cardiac Disorder. See **Ophthalmic Goitre.**

Tic-Douloureux. See **Neuralgia.**

Ticks. See **Parasites.**

Tinnitus Aurium. See **Ears, Ringing in.**

Toe-nail, In-growing. See **Nail, In-growing.**

Tonsillitis. See **Quinsy.**

Toothache. Three kinds of pain may affect the teeth: 1. Irritation of the exposed pulp of a decayed tooth. 2. Inflammation of the jaw. 3. Neuralgia. The first is the most common. The most summary remedy for it (the aching of a tender hollow tooth) is *creasote*. To apply it, wrap a small pellet of cotton around one end of a bodkin or knitting-needle, and dip this in pure creasote. Then carefully press the wet cotton into the hollow of the tooth, and leave it there awhile. If any of the creasote runs over into the mouth, it will burn the gums or lips unpleasantly. Cold water should therefore be at hand to wash this overflow off as quickly as possible. Sometimes more than one such application may be necessary to kill the sensitive end of the exposed nerve. This is what creasote does when it has a full chance. No harm results afterwards to what is left of the tooth. Some dentists have imagined that the tooth itself is killed, and will then rapidly decay; but I kept in my mouth several teeth for fifteen years after the exposed end of their nerves had been made insensible by creasote.

Less disagreeable for the same use are oil of cloves, a drop of chloroform, or laudanum, raw whisky to rinse the mouth, and smoke of tobacco. Either of these may often succeed; but nothing is so sure a cure for this kind of toothache as creasote, properly applied.

Inflamed face is a different thing. At or near the root of a tooth there may be an inflammation, ending in a "gathering" (suppuration, abscess). Then there is no full relief until the matter finds its way out. This generally takes place after a few days of suffering. A "gumboil" may often be opened to advantage with a lancet, as soon as the swelling fairly begins to soften with matter. In a protracted case the advice of a dentist will be very desirable. Occasionally the abscess will be in the socket

of the tooth, and its removal will be necessary. From experience, however, I will say, that the *height* of the inflammation is a time when the extraction of a tooth, unless under the momentary insensibility produced by breathing nitrous oxide gas, is uncommonly painful. When made unconscious by that gas, which may be safely breathed by any one in ordinary health, nothing hurts "the least bit." It is a wonderful invention, for those who hate or fear pain. When a jaw is inflamed generally, it swells, aches, and disables as well as disfigures the sufferer. Poulticing it (putting laudanum on the flaxseed poultice), and rinsing the mouth with laudanum occasionally, are about all one can do for it, unless the *early* application of one or two dozen *American leeches*, and lancing when it softens.

Neuralgia of the face may seem to fasten on some of the teeth. Sound ones have now and then been supposed to be guilty of the pain, and have been needlessly extracted. *Treatment* of this trouble is properly the same as for other forms of neuralgia. See **Neuralgia.**

Trichina, Trichinosis. See **Worms.**

Trismus. Lockjaw. See **Tetanus.**

Tubercle. A morbid deposit in the lungs, or elsewhere in the body, taking the place of the natural tissues there, and interfering with their functions. Tubercles often soften, making cavities in the lungs; in other cases they remain nearly stationary, or harden into a chalky material. *Tuberculosis* is a constitutional disease; not unfrequently hereditary. It consists in a tendency to the formation of tubercular deposits in various organs; most often in the lungs, glands, and brain. Much has been said lately to make it appear that a minute *bacillus* ($\frac{1}{10000}$ of an inch long) is always the cause of Tubercle. This has been referred to under the *Germ Theory of Diseases.* My present conviction is that, most probably, the bacillus makes its habitation in tuberculous lungs, just as rats, mice, and cockroaches make theirs in old, decaying houses; but that *causation* does not exist in the one case any more than in the others. See **Consumption.**

Tubercular Meningitis. See **Brain, Inflammation** of.

Tumors. Growths or enlargements in or upon any part of the body. A small and hard tumor is often called a *wen.* The most important difference between different tumors is as to whether they are or are not *malignant;* that is, tending to increase without limit, and to undergo destructive changes, which exhaust the strength and shorten life. *Cancers* may be said to include all malignant tumors, although other names also are given to some of them. (See **Cancer.**) Non-malignant tumors may be *fibrous, fatty, bony* (*exostosis*), *glandular* (*adenoid*), *cystic,* etc. When these are not much in the way, and not very unsightly, they may

as well be let alone. If they are so large, or so located, as to cause much inconvenience, surgeons often remove them to advantage. *Internal* tumors require much skill to determine their character.

Tympanites. A drum-like swelling of the abdomen, from excess of wind in the bowels.

Typhlitis. Inflammation of the *cæcum,* which is the first portion of the large intestine, on the right side of the abdomen, just lower than the navel. *Perityphlitis* is inflammation of the *peritoneum* (serous membrane) around the cæcum. See **Bowels, Inflammation** of.

Typhoid Fever. A low and slow fever, very prostrating; lasting from three weeks to two or three months. It is not contagious, but in many instances can be traced to bad drinking-water or breathing foul air. It comes on more gradually than any other fever. Early symptoms are, headache, weakness, heat of skin, bleeding at the nose, cough; sometimes diarrhœa. Then, greater weakness; soreness of the abdomen on the right side, low down; diarrhœa; decided fever, with pulse 110 to 130 in a minute; heat of skin 103° to 106° in the armpit; constant drowsiness, with low muttering delirium, especially at night; dulness of hearing; rose-colored spots scattered over the surface of the abdomen; a foul tongue, at first white, then brown, sometimes almost black, cracked; and covered with a thick secretion (*sordes*); the face dark-purple, with a more or less glossy appearance of the skin. *Bad* cases will have also bleeding from the bowels, retention or (worse) suppression of the urine, twitching of the tendons at the wrists, very rapid and feeble pulse (140 to 150), heat of skin in armpit 106° to 108°, clammy perspirations, coldness, collapse, and death. Much the larger number of patients with Typhoid fever recover; but it is always an uncertain disease, to the very last. Sometimes *relapses* occur, when the patient seems to be getting well. During convalescence, an imprudence in diet may so irritate the not yet healed semi-ulcerated bowel (small intestine) as to cause *perforation,* with escape of contents of the bowel into the peritoneum, which will be almost certainly fatal within a few days.

Good signs in Typhoid fever are: pulse under 120 in the minute; heat of skin not above 104° at night, 103° in the morning; tongue light red, and cleaning off early (within three weeks from the beginning of the attack); drowsiness not very deep, and delirium moderate; urine passed regularly; diarrhœa not very frequent or copious; weakness not extreme. Bad signs have been already described above. *Children* often have *vomiting* as a symptom of Typhoid fever; adults very seldom. *Irregular* attacks are common in children, and not rare in adults; in which some only of the above described symptoms are present; making the cases sometimes quite obscure.

Treatment of Typhoid fever is *management;* there is no specific "cure" for it. I do not believe it can ever be *cut short* (under three or four weeks) without risking cutting short the patient's life.

Not a few cases will get well under good nursing, without a drop of medicine. The great needs are, *quietness* of body and brain; freshness, but never coldness, of the *skin;* sufficiency, but not exhausting excess, of the *looseness of the bowels;* frequent small portions of *liquid* food, day and night; and care that the patient does not *exhaust his little strength* by getting out of bed, or even, in very weak cases, sitting up in bed too soon.

As to *food, milk,* beef-tea, and beef-essence are the staple articles. After the disease has got into its regular course, the routine may be, a tablespoonful of milk one hour, and a tablespoonful of beef-tea (or, in the feeblest, beef-*essence*) the alternate hour, day and night.

Two hours' intervals will do with those least prostrated; and when convalescence begins, of course the times must be gradually lengthened, first at night. But, in the midst of the fever, the *weakest* time is always *between midnight and daylight;* one, two, or three o'clock in the morning. What do we say about *stimulation?*

This must be a matter of judgment in each case. In the majority of cases of Typhoid fever, no alcoholic stimulation is necessary. It can usually be borne well, and, in a few cases, in all that are greatly prostrated, its use is important, and may save life. The *test* of its doing good and not harm is, that, after a few doses of it, the pulse grows *slower,* the skin more *moist,* the tongue *cleaner,* the *delirium* less, if that be present, or, if there is stupor, that becomes less profound. Should the pulse instead, under whisky or wine-whey, become *more rapid,* the skin *hotter* and *drier,* the delirium *more talkative,* or the stupor deeper, it should be withdrawn at once; and, if renewed because of seeming prostration, the dose should be less than before. The largest amount of alcohol I ever gave to a patient with Typhoid fever was a tablespoonful every hour (for a time) of milk-punch, one-half of which was whisky; the rest milk. A tablespoonful every other hour, of punch made of one tablespoonful of whisky and two tablespoonfuls of milk, will be enough for most of those who require such stimulation; and, setting aside those who were before broken down by intemperance or other causes, in the majority of cases (as before said), no alcoholic stimulation will be needed.

Medicine is sometimes appropriate and important, for special symptoms or complications of Typhoid fever; but these had better be left to the physician. I have no confidence at all in the violent practice (called "antipyretic") of some at the present time, especially in Germany; of dosing the patient with twenty grains of quinine at a time, or plunging

him once or twice daily into a cold bath. Spare me both of those, if ever I have Typhoid fever.

One precaution further must be spoken of. A patient with this or any other continued fever must not lie too long at a time *on his back*. The circulation of the blood is sluggish in such a disease; it may stagnate in the lungs, if one position be too long maintained, and then, first congestion, and afterwards inflammation (of a low order, typhoid pneumonia) of the lungs may result. Twice or thrice every day and night he should be gently turned over on one or the other side, so as to avoid this settling of the sluggish blood.

After recovery from Typhoid fever, the strength may return very slowly. This weakness may be shared by the brain; mental efforts of much severity (as study or business) must be very gradually and cautiously resumed.

Typhus Fever. So similar is this to *Typhoid* fever, that until about fifty years ago the distinction between them was not clearly made out by physicians. In both we have great *prostration*, a *slow progress*, *drowsiness*, *deafness*, *delirium* of a low muttering kind, and a duration of the attack, in those who recover, of not less than three, oftener four or more weeks. But in *Typhus*, the causation is almost always clearly traceable, to either *crowd-poison* or direct *contagion*. *Ship* fever, *camp* fever, *jail* fever; those are names given to varieties of Typhus, under different circumstances, always those of *crowded human beings*, tainting the air with emanations from their bodies. Cold or cool weather favors the generation of Typhus. It is a disease of cold temperate climates, just as plague and cholera belong especially to tropical regions. A patient ill with Typhus seems to have in himself the poisoning power of a whole crowd; in other words, the disorder is "catching," as Typhoid fever is not.* Yet its contagion is not very strong, and can, as a rule, be dissipated by cleanliness of the person of the patient, and abundant ventilation of the place in which he is cared for.

Symptoms common to Typhus and Typhoid fevers have been mentioned above. *Differences* are these: Typhus is less slow in coming on, and more rapid in going to its fatal end, or to recovery when not fatal; there is, in it, no bleeding at the nose, and no cough (unless *pneumonia complicates* the attack); there are no "rose spots" on the abdomen, but there may be a rash, a little like that of measles; the belly is not swollen nor tender, and there is no diarrhœa; the face has a dusky instead of a purplish redness; there is more tendency to *stupor* (coma) than in

* I do not here discuss the opposite opinion to this, though it is held by many medical men, because my convictions are so positive on the subject. See "Essentials of Practical Medicine," or other professional works.

Typhoid fever; death may occur even within the first ten days; and, after death, examination of the bowels shows the absence, in Typhus, of changes which are characteristic of Typhoid fever. I have seen patients with the two diseases lying alongside of each other in a hospital ward, and feel sure that I could tell, without any information about them, which was Typhus and which was Typhoid fever, from their countenances alone. Still, now and then, *mixed* attacks do occur.

Treatment of Typhus Fever must be, as with Typhoid, *piloting,* not disturbing, management. There is a tendency to *greater prostration* in Typhus. This needs very close watching, day and night; and there is occasion for alcoholic stimulation in a greater number of cases than in Typhoid Fever. I believe that the majority of patients with Typhus require some alcoholic medication; the minority only, of those with Typhoid really need it. Yet, while a resident Hospital physician, I had an attack of Typhus (caught from ship-fever patients), for which, before the nature of the attack was suspected, I was bled and leeched. After that, the only alcoholic dosing was of one wineglassful of wine-whey, taken in the course of a day; and as that did not agree well, it was not given again. I am glad thus to have vindicated, by an example, the right and capacity of the minority to do without alcohol through an attack of Typhus.

Particulars of the objects of special care in management of Typhus fever, have been already referred to under Typhoid fever;—and elsewhere under **Nursing.** It may be repeated, that the passing, or not passing, of water from the bladder must be noticed all through the disease, and especially when there is stupor present. The same care must be taken, also, as in Typhoid, not to let the patient lie many hours at a time on his back, for fear of passive congestion of the lungs, from stagnation of the blood.

The routine of frequent small doses of *liquid* food (milk, with or without whisky, as the case needs; beef-essence or beef-tea), hour by hour, day and night, until the time of danger from prostration has passed by,—all this is the same, with only greater need, usually, of such support, in Typhus *as in Typhoid Fever;* which, therefore, see on this subject. The use of quinine as a tonic, and of other medicines, in both of these fevers had better be left to the physicians in attendance.

Ulcers. Sore places on any part of the body which are slow to heal. They are most common and troublesome on the legs; especially in persons who have *swollen* (varicose) *veins*. In order to heal an ulcer, the part must be kept at rest. The sore must also be covered from the air. With a simple, not very large ulcer, this may be done with *simple cerate*, spread thickly on lint or soft linen, and changed every day. If healing does not go on under this, then use, instead, lint, linen, or soft muslin, soaked in *lime-water;* the rag being covered with oiled silk, or oiled paper, or rubber-cloth, to prevent evaporation. The lime-water rag should be changed night and morning.

Troublesome ulcers may be either of the following: 1. Inflamed. 2. Indolent. 3. Sloughing. *Inflammation* of an ulcerated surface seldom occurs unless it is irritated by some sort of violence, as by walking about with a bad ulcer of the leg. It should be treated with perfect rest, and poulticing with bread or flaxseed meal.

Indolent ulcers are those which look flabby; not of a bright red color, with a clean, smooth, whitish edge, but dull-colored, and often with jutting rounded parts, called "proud flesh." Such require *stimulation;* touching daily (lightly) with a crystal of *bluestone* (sulphate of copper) or *lunar caustic* (nitrate of silver); the lime-water dressing will, as a rule, agree with them better than simple cerate; or we may use this: alcohol one part, glycerin two parts, and lime-water three parts. *Iodoform* in powder, lightly sprinkled over the surface, may be applied every other day. When the ulcer is *large,* this should be used in moderation, lest too much of it may be absorbed, with poisonous effect. This will not happen, however, if, as above said, it be lightly sprinkled, and not more than every other day.

Ulcers very slow to heal are sometimes assisted in doing so by *skin-grafting;* that is, nipping little bits of living skin from some sound part of the body, and *planting* them in the middle of the sore. The healthy skin soon begins to grow, and spreads over the ulcerated surface, covering it up. *Sponge-grafting* is another operation sometimes successful in an analogous way.

Sloughing ulcers show a low state of vitality in the part, and probably in the whole system. The patient's general condition needs attention. If he be suffering from anything that drains his strength, and especially if he does not sleep well, *opium* in some form is likely to be called for, at least at night; and *quinine,* as a tonic, eight or ten grains a day, with concentrated nourishing food; perhaps careful stimulation. To the part, cleansing and stimulating applications are necessary: as pure alcohol; solution of chlorinated soda (a teaspoonful in a teacupful of water); or dilute nitric acid (six drops in a teacupful of water) to wash

the ulcer with, once a day; and a *charcoal poultice* (see **Poultices**, under **Remedies**), or a poultice made of *chopped carrots*, as a dressing. Iodoform powder will be useful to a sloughing ulcer, sprinkled over the surface before applying the poultice.

Cancers have ulcerated surfaces, which, instead of healing, spread and "eat," deeper and deeper. No local applications will heal these; they can merely be protected from outside injury, and made less offensive by cleansing *washes;* such as pure alcohol, or alcohol (one part), glycerin (two parts); or chlorinated soda solution; or permanganate of potassium (ten grains to four ounces of water). Even lime-water, or Castile soap water, used twice daily, will lessen the disagreeableness of such sores.

Ulcer of the *stomach* has been spoken of already. See **Stomach.** For ulcer of the Throat, see **Throat, Sore.**

Uræmia. Presence in the blood of matters which ought to have been carried away by the secretion of urine; sometimes called *urinæmia.* It occurs whenever there is, from any cause, *suppression of urine.* This happens towards the end of cases of *Bright's disease* of the kidneys. Its symptoms are: headache, dimness of sight, vomiting, diarrhœa, convulsions, and, at last, stupor; ending in death. When coming thus at the winding up of an incurable disease, treatment will have no important effect upon suppression of urine. If it should, in less degree, result from other causes, as exposure to cold and wet, or scarlet fever, we should try to relieve the kidneys; by dry or cut cups or a mustard-plaster to the back; the warm bath; purgation with Rochelle salts, or cream of tartar (which is *diuretic*); and action on the kidneys themselves, by lemonade, sweet spirits of nitre, juniper-berry tea, etc.

Urine, Incontinence of. See **Incontinence** of **Urine.** **Retention** of. See **Retention** of **Urine.**

Vaccination. This may be rightly regarded as one of the three greatest benefits ever conferred upon mankind by medical science; the others being the introduction of *anæsthetics*, to obviate the pain of surgical operations, and the discovery of the use of the alkaloids of *Peruvian bark*, for the cure of malarious fevers.

Until about the end of the last century, it was common to inoculate young persons with matter from small-pox patients; it being found that mostly the attacks resulting were milder and less dangerous to life than those taken in the ordinary way. But physicians concluded at last that this practice (introduced from the East by Lady Mary Wortley Montagu in 1718) ought to be abolished; because now and then the inoculation was fatal; and the *contagion* of the mildest attacks was as deadly to those not inoculated, as was that of natural small-pox. It was well known, however, that persons who had been inoculated successfully very rarely had small-pox afterwards.

Dr. Edward Jenner, living in the country in England, learned that it was known among dairymen, that *cow-pock* was sometimes taken by those who milked cows which had pustules upon their udders; and that persons who had had cow-pock did not take small-pox when exposed to its contagion. Having a very philosophical mind, he reflected that if he could *inoculate with cow-pock*, it ought to have the same preventive effect. This he tried; first in 1796. His success was such that he at once labored to bring this practice (called *vaccination* from the Latin *vacca*, a cow) into general use. It was introduced into America in 1799, and into Austria the same year; France and Spain, 1800; Italy, Russia, Sweden, and Denmark, 1801; India, 1802.

To show briefly the effect of the establishment of vaccination upon the ravages of small-pox, we may mention that for thirty years before Jenner's time the average number of deaths from that disease every year was, in Great Britain alone, 30,000; about 3000 in each million of people. Were such a mortality from it to occur now in the United States, we should lose in every year about 150,000 people by small-pox! The greatest number of deaths from it ever recorded in the present century in America was about 4000, in 1881, in the cities of our country. Estimates of the most liberal kind of the probable number for the whole country in that year, could not reach beyond 10,000 to 15,000; at most, *one-tenth* of that of average years before vaccination! As to *pock-marked faces*, one example will do. In one town in Scotland, in the years from 1728 to 1764, of an average population of 4200, 3700 were more or less marked by small-pox.

Vaccination is, as it is well known, very imperfectly attended to in our large cities. Philadelphia, for example, in 1870, with a population

Fig. 1. VARIOLOID.

Fig. 4. ITCH.

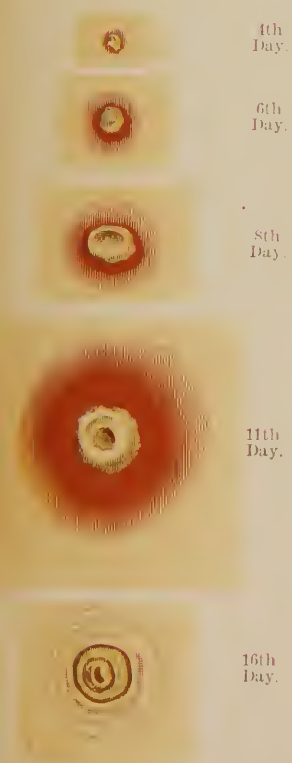


Fig. 2. VACCINE.

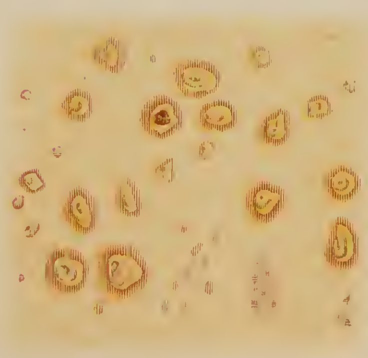


Fig. 3. CHICKEN POX.

of over 700,000 and from 20,000 to 25,000 children born every year, had but 7190 of these vaccinated. Under the *panic* of an epidemic of small-pox in 1871–2, the number increased to 30,000 in the first of those years, and 18,000 in the second; but it went down again, in 1875, to 5685. If *every child born* was properly vaccinated, and *revaccinated* when between twelve and fourteen years of age, there is good reason to believe that small-pox would be exterminated.

Revaccination is important. Why? Because the first vaccination may not have been perfect; and also, because, although in the large majority of cases the protection given by vaccination lasts for a lifetime, in a certain minority of instances it does not; and the only way to be sure about this is to *try it again.* It is too trifling an operation to be withheld, in view of the immense value of its protection when needed.

Are there any sound objections to Vaccination? No!

I have read the strongest and boldest arguments * ever put forth by its opponents; and I declare them to be worthless against it. There is no room in this book to go into their discussion. The medical profession is almost literally *unanimous* on this subject. No *leading* medical authority, on either side of the ocean, is or has ever been against it. The antagonism to it must originate in morbidness of mind; such as makes some persons still believe in witchcraft, or others deny that the world goes round once in twenty-four hours. There is, with the simple care, which it is easy and usual for physicians to take, in selecting the "virus" used, *no danger of giving any disease* by vaccination.

Is it best to employ "*bovine*" virus; that is, directly from the cow or heifer, or will that from an infant's arm do as well? I have studied this question with much care; and conclude that, on the whole, the most secure and satisfactory way is to use *humanized* virus; that which has been at least through a few (or even a few hundred) healthy human systems. It is very well for those skilful in the matter to start new virus, now and then, directly from the cow; the original Jennerian vaccine. But this requires more skill and pains than are always reliably given; and there has been a good deal of disappointment of latter years with "bovine virus," both in Europe and in this country. An advantage of the humanized article is, that it has just shown its virtue by its *effects.*

When should the first vaccination be performed? If there be no exposure to the contagion, the second or third month of infancy will answer. If there is such exposure, let it be done any time after birth.

How shall it be done? Two kinds of material are used; the one is

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* See a review by the author of several of these publications, in the Philadelphia *American*, Sept. 2, 1882.

lymph, taken on quill-pieces from the sore in its watery stage, about the eighth day of the vaccination. Always, a *healthy* infant's *first* vaccination is to be chosen for the supply. The matter dries on the quill-ends, and can be kept, if sealed up from the air, for a few days (seldom so much as a month) without losing its specific quality.

Twenty-five years ago, it was the general practice in this country to vaccinate with the *scab,* from the matured pustule, coming off about the nineteenth day. With other practitioners, I have had every reason to be satisfied with this. One particular advantage of it is, that the appearance of the scab goes much towards judging of its genuineness. It should be irregularly circular, nearly flat, rather thick, and of a mahogany brown color; larger than a scab from almost any other kind of sore; decidedly larger than a scab from a real small-pox pustule.

To operate: take either the *fresh* lymph (arm to arm), if you can get it, or the *dried* lymph, not too old, or the *scab,* less than a month old, and kept out of the air. Moisten a small portion of either of the latter with pure tepid water; mashing the scab, if it be employed, into a paste. A very little piece will suffice for one vaccination; not more than the size of two pins' heads will be necessary. What is wanted, then, is to get this matter *through and under the skin,* so that some of it will be absorbed into the blood. You do not want the part to bleed; because that would wash it all away. You may push out a little flap of skin with the point of a lancet; or *puncture* the skin, making several little dots near together; or *scratch* it in tiny lines, crossing each other, making a square; and, either way, pressing, laying, or gently rubbing the virus-paste in and on the part. The art of the operation consists in *getting through the skin without causing blood to flow.* When it has been done, keep the arm (the best place is the outside of the arm, halfway between the shoulder and elbow) undisturbed until it dries; about twenty or thirty minutes.

Fig. 241.

VACCINATION SCRATCHES.

As to its course, nothing will show, if it goes on all right, for nearly four days. Then a little red point will appear, which grows larger, and becomes a vesicle (a little water-blister). By the tenth or eleventh day this has filled with matter, and sinks down, navel-like, in the middle; the characteristic "umbilicated" appearance. It has, then, a good deal the shape of a tiny hat, with the middle of the crown pushed down. Before that time, about the eighth day, a bright red circle has formed around the sore. This fades after the eleventh day, and the pustule (which, however, has little or no yellow matter in it) dries up into a thick, round, mahogany-colored scab; and this comes off of itself from the eighteenth to the twenty-first (usually the nineteenth) day. Of

course it may be accidentally rubbed off sooner. All these stages are important, as showing it to be a good, regular vaccination. No other kind of sore behaves in the same way. The scar left is also peculiar. It is, when perfectly good, large for the size of the sore, and *dotted* or pitted, as if made of several little sores merged into one.

If the first vaccination *does not take*, it should be done again. When twice done with the same matter, and yet no effect follows, other virus had better be tried. Some infants are much less susceptible to it than others; in a very few it will not take at all. There is reason to think, however, that the system may be affected by it, and so protected, in some cases, without any sore coming out on the arm. I knew one child to be vaccinated nine times, with at least three different scabs of virus, without any sore following; and yet when exposed to small-pox a year or two afterwards, it took only varioloid, having a mild case. If a rash or "breaking out" follows vaccination, the child's skin must have been unusually predisposed to such things.

Revaccination should be done in precisely the same way. The usual time for it is about the age of fourteen years. Sooner will be better, if there is exposure to small-pox contagion. Also, it may wisely be repeated, as a *test* and *fresh means* of protection, every time (at least after one, two, or three years) that one is again brought in contact with the disease.

I close my remarks on this subject by saying, with emphasis, that *everybody ought to be vaccinated*, and *revaccinated* at least once.

Varicella. **Chicken-Pox**; which see.

Varicose Veins. See **Veins, Varicose.**

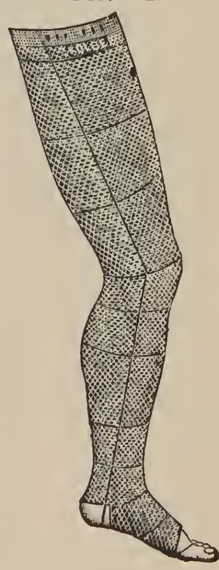
Variola. See **Small-Pox.**

Varioloid. Modified small-pox, as it occurs in persons who have been vaccinated. See **Small-Pox.**

Veins, Inflamed. See **Phlebitis**, and **Milk-Leg.**

Veins, Varicose. Enlarged veins, without inflammation. They are not uncommon in the legs; made worse by standing a great deal. Pregnancy is a promoting cause of varicosity of the veins, by the pressure of the gravid womb upon the large veins (especially the great *vena cava*) in the abdomen.

Fig. 242.



ELASTIC BANDAGE, APPLIED.

Varicose veins are sometimes cured by a surgical operation; but this is seldom necessary. The proper thing to do is to

wear *elastic stockings*, which compress the veins enough to prevent inconvenience from their enlargement. If such stockings cannot be had, *bandaging* is a tolerable substitute. A bandage of soft old muslin, two and a half inches wide, should be worn while walking or sitting up. It must be wrapped first around the ankle; then around the foot; again around the ankle, and thence obliquely around the leg; turning or reversing it at each round, so as to make it lie smoothly on the limb; firmly, but not uncomfortably tight.

Vertigo. Giddiness; dizziness; turning in the head. Sometimes one's own head seems to be turning around; sometimes everything else turns instead. *Causes* of vertigo are: most frequently, indigestion, with "biliousness"; *i. e.*, the bile not being properly removed by secretion from the blood; secondly, general debility; thirdly, a disorder of the internal ear or ears, called Menière's disease; lastly, and most rarely, disorder of the brain. *Treatment* of this symptom should, of course, be according to its cause. For "*bilious*" dizziness, a grain or two of blue mass twice a day (taken only for a day or two); a teaspoonful of magnesia; if the symptom comes often, omitting the blue pill, and using soda (sodium bicarbonate), a *pinch* at a time, instead of magnesia. Vertigo of *debility* requires that the patient's strength be saved by avoiding much exertion, and improved by good diet, tonics, change of air, etc. *Ear disease* and *chronic affections of the brain* are too difficult of discrimination to be dealt with in *Home* medicine; they require skilful medical attention.

Vomiting. This is a symptom of various affections, and has been specially considered earlier in this book, under **Signs of Disease.** Its *treatment* also has been dealt with in our section on **Remedies,** under the heading **Sick Stomach.** See page 529.

Warts. These are small outgrowths of the *cuticle* or scarf-skin (*epidermis*); rooted, however, in the deeper middle coat of the skin (*rete mucosum* of the books). To get rid of them, pare away all the outer hard part, which has no feeling; then touch the remainder with a drop of *nitric acid* (taking care to put it *only* on the wart, which requires management), or *chromic acid*, or a stick of *caustic potassa*, slightly moistened. A few such applications, a few days apart, will cause the wart to cease reappearing.

Water-Brash. See **Dyspepsia.** It may be mentioned here that *buttermilk* is strongly recommended by some practitioners for the cure or relief of this symptom of chronic indigestion. The term *Water-brash* means the coming up of a watery fluid from the stomach into the throat and mouth. The great thing, of course, is to cure the dyspepsia of which it is only a part.

Water on the **Brain**; in the **Chest**; etc. See **Dropsy.**

Whitlow. See **Felon.**

Whooping-Cough. See **Hooping-Cough.**

Women, Diseases of. Many large books have been written upon this subject; which now has a department of Medicine and Surgery to itself, called Gynæcology. Its management involves as great difficulties in practice as any other part of Medicine or Surgery. It would, therefore, be quite vain to attempt to dwell at length upon it in a work like the present, which is intended for unprofessional readers.

Already, we have given consideration, sufficient for our purpose, to **Amenorrhœa, Dysmenorrhœa, Menorrhagia, Leucorrhœa,** and **Chlorosis,** in this alphabetical series. Other diseases peculiar to women are: *Inflammation of the Womb; Irritable Uterus; Prolapsus* (falling) of the Womb, and other *Displacements; Tumors of the Womb; Inflammation of the Ovary; Ovarian Neuralgia; Ovarian Displacement; Ovarian Tumor and Dropsy.* A much longer list will be found in any professional work on Gynæcology.*

Probably the most important remark to be made here is, that no one should too easily suppose herself to be affected with any of the disorders peculiar to the sex. Such disorders, in marked degree, are not very common; and they are aggravated by habits of invalidism. Constantly fixing "expectant attention" upon any organs of the body tends to derange their function.

There is a quaint old maxim which may furnish us with a parallel precept. It is said that "no one should touch his eye, except with his elbow." This is easily understood. It is equally sound advice that no

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* Of such works, that of Prof. T. Gaillard Thomas, "A Practical Treatise on the Diseases of Women," may be especially commended.

woman should ever think of her ovaries or uterus, unless their condition *compels* her attention to them. It is not right, of course, that any real symptom of ill health, local or general, should be neglected; and the judgment of a competent physician in such a matter should be accepted and obeyed. But imaginary diseases ought to be kept out of the way. The human body, in all its parts, is wonderfully well made; its mechanism, until wrongly used or ill cared for, is perfect, and does not readily get out of order. It is proper for me to be very cautious in referring to liabilities of medical minds, in a work like the present; but I may safely extract a few sentences from the early part of the standard Treatise of Dr. T. G. Thomas, than whom, on such topics, there is no higher authority in this country. He observes:* "The excessive surgical tendency of many of the leading gynæcologists of our day is a matter to be deplored by all who wish well to gynæcology. Many cases which time and patient medical treatment would readily cure are met boldly, and without sufficient consideration, by operations more or less formidable." "No one will suspect me of a want of appreciation of the operations to which I have alluded, nor of timidity in employing them. It is not to their use, but to their unquestionable abuse, that I am objecting. The last remark applies with equal force to the almost exclusive reliance which by many seems placed upon local treatment in the cure of uterine disorders. One who frequently sees cases of uterine disease in consultation, will meet with many in which he is called upon to urge cessation of all local treatment, as the first step in the proper management of the case."

Here also we may cite briefly Prof. Thomas's list of the main causes of disorders of the womb: "Want of air and exercise; excessive development of the nervous system; improprieties of dress; imprudence during menstruation; imprudence after parturition (childbirth); prevention of conception and induction of abortion; marriage with existing uterine disease."

On the subjects of *Inflammation* and *Irritability* † of the Womb we must refer entirely to professional works. Something may be said, however, in regard to *Prolapsus* and other *Displacements*.

Prolapsus is falling of the womb. Its causes may be stated, in a general way, to be, 1. Influences *increasing the weight* of the womb; as fulness of blood therein (congestion) from standing or walking much during menstruation. 2. Influences *weakening the natural supports* of the womb; as general relaxation, from loss of tone in the whole system.

* "Practical Treatise on Diseases of Women; Historical Sketch of Gynæcology."

† This is not quite an exact term; "Areolar Hyperplasia" is Dr. T. G. Thomas's designation for it.

3. Influences *pressing the womb out of place;* conspicuous among which are, tight lacing, and the weight of heavy clothing on the abdomen. Not only *Prolapsus* or simple sliding downward of the uterus, but other displacements, are promoted by these and some other causes. Those just mentioned are the ones most under control.

Symptoms of Prolapsus are: a feeling of dragging and weight in the lower part of the abdomen; irritation of the bladder and lower bowel; pain in the back and loins; unusual fatigue in walking, or in lifting anything heavy; and *leucorrhœa* (the "whites"). The presence of several of these symptoms together leads to a reasonable suspicion of the existence of prolapsus. The *certainty* of its existence is obtainable only by a professional examination. On account of its importance to health, it is right not to let false delicacy stand in the way of such a determination of the real state of the case, when considered necessary by an attending physician.

The other most common *displacements* of the womb are *anteversion* (the upper part, or "fundus" of the uterus being bent too far forward), and *retroversion* (bending of the fundus backward). These are promoted by the same general causes as those above mentioned, as well as by pregnancy and its after events and conditions.

In the *treatment* of prolapsus, the chief aims must be: to lessen as much as possible the pressure from above upon the abdomen, and to strengthen and supplement the uterine supports. The first of these is done by wearing skirt-suspenders, putting the weight of the skirts on the *shoulders* instead of on the abdomen; by avoiding all unnecessarily heavy clothing; and by the use of an *external abdominal supporter.* This is of the nature of a firm but somewhat elastic band or broad bandage, which holds up all the contents of the abdomen together. The *direct* support of the womb within the abdomen is obtained by the use of a *pessary.* There are several kinds of pessaries: Hodge's, Meigs', Albert H. Smith's, Graiily Hewitt's, Cutter's, and others. Prof. T. G. Thomas speaks very well of Cutter's; which has a stem passing out of the body to go either backwards or forwards in a curve to a belt around the body. The others above named are placed entirely within the body. *Simple prolapsus, anteversion* and *retroversion* require differently shaped instruments, which should be carefully adapted to each case. This can only be done by a skilful practitioner. We must add, that examination should be made after a pessary has been used for a few days, to see whether it suits or not, and especially whether it does or does not *gall* or excoriate the parts. If it does so, it must be removed at once. Even the best suiting pessary should be taken out once in every few weeks, and be well washed with Castile soap and water before

replacement. Sometimes the instrument is a good deal acted upon and spoiled by the natural fluids. One who wears a pessary should use a wash every night, with a vaginal syringe: lime-water, alum-water, boroglyceride dissolved in glycerin, or, at least, Castile soap water. Cutter's pessaries can, and ought to be, taken out every night, after getting into bed, and replaced in the morning.

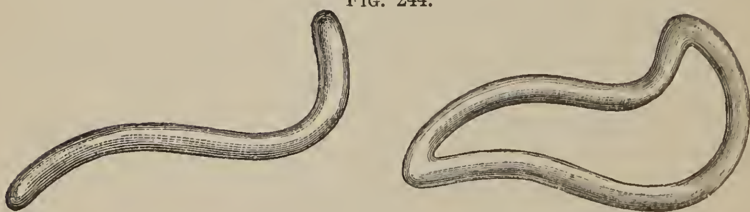
Anteversion and *Retroversion* may need to have the error of shape of the womb corrected by the skill of the medical attendant, before a pessary can be employed with advantage.

Tumors of the uterus are generally either 1. Polypi; 2. Fibroid; or

FIG. 243.

DR. HODGE'S PESSARY.

FIG. 244.



DR. ALBERT H. SMITH'S PESSARY.

3. Cancerous tumors. The last are, as a rule, incurable. Polypi are tumors with a small stem connecting them with the interior of the womb. The whole subject of the discovery and management of uterine tumors is too professional to be dwelt upon here.

Ovarian diseases would also, for particular consideration, take us beyond our scope in this book. A few words only are proper concerning *Ovarian Dropsy*. This results from the formation, in connection with an ovary (see Anatomy), of one or more watery tumors called *cysts*. These gradually enlarge, until they stretch the abdomen greatly; at last causing much distress, obstructing breathing, and wearing the patient's life out. This may not happen, however, for several years.

Ovarian Dropsy is distinguished from common abdominal dropsy (ascites), by the following signs: it begins almost always in women between twenty and forty years of age; it increases slowly, seldom ending in death under two or three years, and often lasting much longer with very little change; it begins on one side, and spreads over so as to fill the whole abdomen; when large, the roundness of the abdomen does not flatten out when the patient lies on her back; besides other indications obtained by *percussion*, etc., to be appreciated only by those who have had professional training.

Treatment of Ovarian Dropsy can amount to but little unless an operation be concluded upon. An ovarian cyst may be *tapped.* Most practitioners think it best to reserve this operation for the temporary relief of patients upon whom it is considered not prudent to perform the greater operation of *removal* of the diseased ovary, cyst and all.

This last operation is called *ovariotomy.* First performed by an American surgeon, Dr. McDowell, of Kentucky, near the beginning of this century, it met with much opposition for a long time. Within several years, however, it has come to be recognized as proper in a considerable number of cases. Although recovery does not follow in every case, it does, in a majority of instances, lengthen life; sometimes for many years. All details concerning the operation must be left for works on Gynæcology.

Worms. About twenty kinds of worms are known occasionally to inhabit the human body. Yet comparatively few people are consciously troubled by them. Sometimes the inconvenience caused by them is slight; and when it is considerable, they are not always found out as producing it.

The most frequently troublesome Worms are: *Lumbricoids; Seat-Worms; Tape-worms;* and *Trichinæ.*

Lumbricoid Worms are the most common of all, especially in children. They look a good deal like earth-worms. Now and then knots of them accumulate in the intestines of a child, "giving it fits." One of them may even crawl into the stomach and be vomited up, after a good deal of sickness of stomach. This happened to a patient of mine, an adult. These worms enter with either food or drink; probably in most cases in not very clean drinking-water. They are to be got rid of by two sorts of measures: 1, to make the bowels unsuited to harbor them; 2, to drive them out by *vermifuges, i. e.,* "worm-medicines."

The bowels are most likely to harbor worms, when they are all the time loaded by the refuse of food not digested; either because too much is eaten, or because it is unwholesome in kind; also, when there is *constipation.* First, then, be careful of the child's diet; withhold all

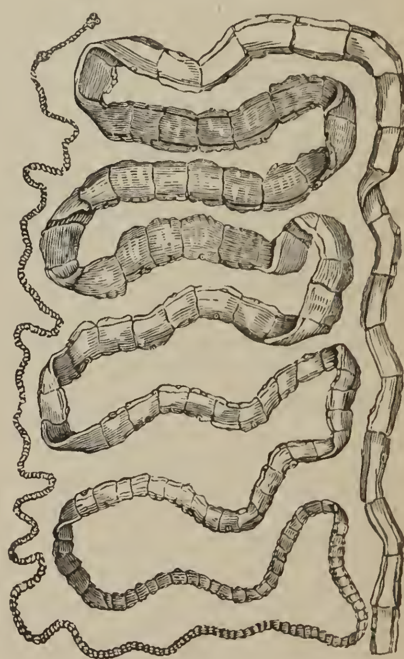
cakes, candies, and other trash; and see that the bowels are moved once a day. Then, if a worm is still seen now and then in the passages (which should be watched), worm-medicine ought to be used.

How do we *know* when a child has worms? Only when it passes one or more of them from the bowels, or throws one up from the stomach. We may reasonably *suspect* worms, when a child's or older person's appetite is bad or irregular; when the belly is swollen; when

FIG. 245.

LUMBRICOID WORM.

FIG. 246.



A TAPE-WORM (TÆNIA SOLIUM).

(whether it complains or not of itching at the nose) there is itching at the fundament; and when there is grinding of the teeth and restlessness during sleep. But this suspicion needs confirmation by the actual sight of worms in the passages.

For the lumbricoid worms, the best *vermifuge* is *pink-root;* spigelia Marylandica. The fluid extract is a good preparation; or better, the *fluid extract of spigelia and senna;* of which the dose is a teaspoonful.

With young children, an overdose should not be given; such might be even poisonous. On *Seat-worms*, see **Santonin**, p. 605.

Tape-worms are chiefly of two kinds, in this country; the *armed tænia solium* and the *unarmed tænia mediocanellata.* The "armor" is merely a circle of very tiny hooklets around the head of the *tænia solium;* which is the smaller worm of the two. Both are flat, whitish, and in segments, like small bits of narrow tape put end to end as in a long string; sometimes ten, twenty, even thirty feet long! The "unarmed" tape-worm gets into human bodies in infested rare *beef*, and is the most common in the United States. The "armed" kind is taken by eating undercooked pork or bacon; as it naturally inhabits the hog, not the ox.

Symptoms of Tape-worm are much like those of lumbricoid worms, with the addition often of an enormous appetite. The worm, as well

FIG. 247.

TRICHINA, MAGNIFIED 150 DIAMETERS.

FIG. 248.

TRICHINA IN MUSCLE, NATURAL SIZE.

as its entertainer, must be fed. But certainty, here also, can only be obtained by finding *pieces* of the Tape-worm in the passages from the bowels. As these come away, others grow; until the *head* is removed, the worm lives and "tapes away" for an indefinite time.

Several vermifuges are used to drive out tape-worms: oil of turpentine; oil (ethereal extract) of male fern; koosso, of Abyssinia, in half-ounce doses, etc. Before taking any of them, the bowels ought to be well opened, and the stomach not much burdened with food.

Trichina is a very small *spiral thread worm.* It may be taken in eating raw or undercooked pork, or sausage; anything of hog's meat. Not nearly all hogs are infested with trichinæ; with the microscope, butchers or others can tell whether the flesh of a particular hog has them in it or not. If present, they commonly count by the hundred thousand, or even by the million. The way to *avoid* trichinæ, with

certainty, is never to taste any hog's meat, or anything made of it, unless it has been *thoroughly cooked*—cooked all through.

When Trichinæ get into the bowels, they work their way gradually through the intestinal walls, and at last fix themselves in various muscles in the body and limbs. The *symptoms* during this progress are not very unlike those of *typhoid fever*, but with more pain and irritation of the stomach and bowels. When they are in the muscles, an imitation of *rheumatism*, with more or less low fever, results. There has been, as yet, no *vermifuge* for Trichinæ discovered; Trichinosis, well marked, is in *most* instances (not all) fatal, within a few weeks at the farthest.

Wrist-drop. A frequent kind of *lead-palsy*, met with among painters or other workers in lead. See **Paralysis.**

Writer's Cramp. A disability of the muscles of the right hand, from too long-continued writing, as in bank officers, etc., who have to sign their names, etc., constantly for a long time together. The main thing for its cure is, *total and prolonged rest* of the hand and arm from all such work.

Yellow Fever. Only certain places are subject to endemics or epidemics of this disease. On the subject of its causation, enough was said, earlier in this book, under "**Causes of Disease.**" It is mostly a malady of Southern countries, and always of the summer-time. It is, moreover, a disease of cities or towns near a river or the sea. Havana and New Orleans have had more of it, during the past century, than any other localities in the Western Hemisphere. Philadelphia formerly had a number of severe epidemic visitations; its last presence in this city was in 1855, and then only in a limited part of the city—"down town," near the Delaware. In this frequenting of cities, Yellow Fever is totally different from remittent (bilious, autumnal, malarial) fever, which is always a *country*, or at least a suburban, disease.

Symptoms of Yellow Fever are, in brief: an abruptly beginning fever, lasting two or three days without remission,with violent headache, flushed forehead and eyes, often delirium, vomiting, *tenderness of the stomach on pressure*, constipation, or at least but scanty and offensive passages. Next comes a remission, which may go on to recovery; but more often it becomes a time of great prostration, with yellowness of the skin, and, in the worst (nearly always fatal) cases, black vomit. Death, when it comes, happens generally on the fourth, fifth, or sixth day of the attack. When reaction follows the collapse, secondary fever occurs, which goes on either to a slow convalescence or to final death by exhaustion.

As a general rule one attack of this disease acclimates a person; that is, he is not likely to have it again, however exposed. As in the case of small-pox, measles, etc., this rule has a certain number of exceptions.

The same is true in regard to its being taken by negroes, who are certainly much less susceptible to it than white people.

Treatment of Yellow Fever is beset with difficulty; on the average, one in three of those who have it dies. Opinions in the Medical profession differ so much about this subject, that it will be best to leave the discussion of it to strictly professional works. I remark these points only: there has been discovered no specific "cure" for it; quinine has been found to have no control over it, such as it has over malarial remittent fever (which resembles Yellow Fever in some respects); among the most certainly useful measures of treatment are, leeches applied to the pit of the stomach, an early dose of a mild saline cathartic, as citrate of magnesium; ice and mineral-water freely during the fever, and, in the same stage, sponging the head, face, and arms with cool or cold water; in the period of prostration, small quantities of liquid food (milk, with wine or whisky in small amounts in the weakest instances, beef-essence, etc.), at short intervals, and quinine in tonic doses, ten or twelve grains in the course of each day.

I repeat the conviction already expressed under Causes of Disease, that Yellow Fever is *never contagious from person to person;* it is a disease originating in *places,* including *foul ships;* to avoid or leave the infected place is to escape the disease. Thousands of people have, at many different times, in Europe and America, gone (both sick and well) from Yellow Fever places to *other healthy* places, without conveying the disease in any well authenticated instance.

PART V.

ACCIDENTS AND INJURIES.

FIRST of all, let it be said in regard to all or any of these, that *coolness* and *presence of mind* are of the utmost consequence. Danger is increased by alarm and confusion. One who has his senses about him may, by simple and prompt action, in some instances, avert serious harm; in all cases, the chances are in favor of this result when one or two, if not all concerned, are possessed of their full intelligence.

Our consideration of these, commonly called *Surgical Emergencies*, will be, as nearly as practicable, in alphabetical order; for convenience of reference by the reader.

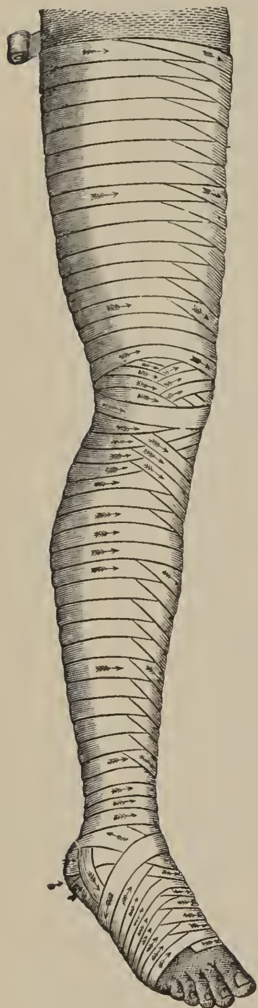
Bandaging. General remarks only are called for here in regard to this; some particulars being mentioned elsewhere, in connection with injuries or other occasions for using bandages. The purpose of bandaging is to retain certain parts of the body, or "dressings" upon it, in position, without too much pressure; or, sometimes, to *make* pressure for a time (as in cases of bleeding), or even continuously (for varicose veins).

Material for bandages may be unbleached muslin, about as thick as that which is used for sheets; or soft unglazed linen. It must vary in width and length according especially to the part upon which it is to be applied. For the chest, as for a fractured rib, it should be about four inches wide; for the thigh or leg of a man, two and a half to three inches; for the arm, two to two and a half inches; if used for a finger, an inch in width will answer. Around the head, a two-inch bandage will be generally wide enough. The *length* may vary from a yard or two to five or six yards in a roll, according to convenience. To make a long bandage of short strips, make their ends overlap a little, and stitch them evenly and smoothly together, without any seam. All doublings and thick edges are to be avoided in bandaging, as they make uneven pressure and cause discomfort.

How to *roll up* a bandage is a matter of simple management. After doubling an end for a beginning, take it in one hand, between the ends

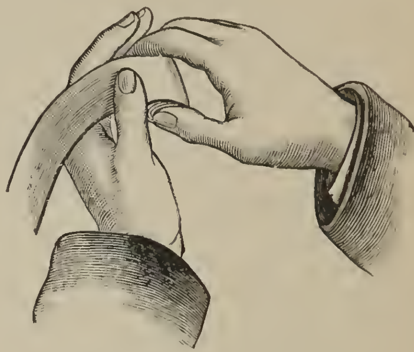
of the thumb and fingers, with the rolled part downwards; holding the bandage then between the side of the forefinger and the thumb of the other hand, so that it may slide between the finger and thumb of that hand, as it is drawn and rolled up by the fingers of the other. In

FIG. 249.



BANDAGED LIMB.

FIG. 250.



ROLLING A BANDAGE.

FIG. 251.

REVERSING BANDAGE.

hospitals they sometimes have a small instrument with which to roll bandages rapidly.

Two rules are very important in bandaging. First, never make any bandage so tight as entirely to check the movement of blood, unless for

a short time (as with Esmarch's rubber-tube compression to prevent hemorrhage in operations) to arrest bleeding ; and second, never so apply a bandage as to compress veins in a way to cause swelling *below it.* To fulfil the first of these rules, the feeling of the patient, and one's own common sense, will generally suffice. In regard to the second, the *neck,* of course, must not be so bound as to interfere with the return of blood from the head through the jugular veins; and, when an arm, or any part of it, is bandaged, the *hand also* must be covered; if it be the thigh, or leg, all below it, including the foot, must be equally compressed. Otherwise, the parts below the bandage would swell up, and might, if so kept long, even mortify.

When bandaging the forearm and arm, it is best to begin by passing the bandage around the wrist; then turn it down over the hand and cover it; afterwards go, with *reverses,* up the forearm, and, if necessary, the arm. In covering the lower extremity with a bandage, begin in like manner around the ankle; next go around the foot; and then, with *reverses,* up the leg.

To apply a bandage to any part, take the bandage in the right hand, with the *outside* of the roll held in the palm, and the thumb touching the part which is being unrolled, along the edge of the roll, inside. The left hand is then to fix the end, and succeeding parts, of the bandage in place where it is applied. *Reversing* is done to make the bandage lie smoothly on an uneven surface; as the hand, foot, forearm, leg, etc. It is effected by turning the right hand which holds the roll, so as to obliquely double the bandage, for one or more turns, as required. A little practice will make this easy enough. For farther specialties in bandaging, besides what will be said under **Fractures,** see works on Surgery.

Bedsores. See **Nursing,** page 628.

Bleeding. See **Wounds,** page 875.

Broken Bones. See **Fractures,** page 849.

Burns and Scalds. *Burns* are caused by dry heat, or by something else than water; *scalds* by boiling water, steam, or other hot fluids. The danger to life of either is in proportion to their extent of surface, and their depth. Even a superficial burn or scald will kill, if it involve so much as half, some authorities say two-fifths, of the body. Death is then produced in two ways; by the *shock,* and by the *arrest* of the necessary functional action of the skin. The *treatment* of burns and scalds is essentially the same for both.

What to do when one's clothes have caught fire, is important. Seize a shawl, rug, mat, coat or overcoat, if any be within reach, and wrap it closely around the burning part. Or, if not, lie down and roll on the

carpet; at the same time crushing the burning garment with the hands. If one sees another person on fire, the same thing ought to be done. A man's overcoat or a rug, etc., may be thrown closely about the victim of the flames, who should be quickly laid down on the floor, so as to be covered more readily and entirely. The reason for this is, that the way to extinguish any fire, large or small, is, to *shut out the air from it.*

When a person is badly burned, the shock to the nervous system is followed by *prostration* or *collapse.* There is great weakness, pallor of face, flickering pulse, short breathing, and coldness of the body. For this condition, *opium,* in the form of *laudanum* (fifteen drops at once, repeated if necessary in an hour, until three or four doses have been taken) is a good stimulus. Small quantities of *whisky* or *brandy* also, one or two teaspoonfuls at a time, may be given, at half-hour intervals, for a while; to be withheld at once when signs of reaction come. Such signs are, strengthening of the pulse, warming of the skin, and return of color to the face.

For the burn or scald itself, there is no better application than *lime-water* and *oil* (flaxseed, olive, or lard oil) mixed together in equal parts. Lint, if it can be had, if not, muslin or linen rags, should be well wet with this, and laid all over the burn. If the burnt surface be extensive, over the lime-water and oil dressing put a layer of *cotton wadding,* for warmth. Should it be a small burn, put instead of this a piece of oiled silk, oiled paper, or rubber cloth.

A burned hand or foot will obtain the best relief by being held in *cold water* for some time. A remedy for limited burns which has lately become popular is, a *saturated solution* of *soda* (sodium bicarbonate). Other applications sometimes used are, simple *oil* (lamp-oil, castor-oil, etc.), and *powdered starch.* But nothing is equal in effect to the "Carron oil," as the mixture of lime-water and oil has long been called.

When the sufferer's clothing covers the burn, it should be carefully removed by untying, unbuttoning, and cutting everything needful, so as to get all off *without pulling* or much moving the injured body. Raised water-blisters should be merely *nicked* to let out the water; leaving the cuticle to protect the true skin underneath. Then apply the dressing above spoken of. If the patient reacts and does well, the lime-water and oil rags must be renewed when they begin to get dry; taking them off with extreme gentleness, so as to disturb the parts as little as possible. After two or three days, a dressing of *simple cerate,* thickly spread on lint or soft rags, may be substituted for the oily dressing. Deep and extensive burns are sometimes very slow to heal, and leave ugly contracting scars which may require special surgical attention.

Carrying Injured Persons. See **Transportation**; the last item in this series of subjects.

Choking; Strangling. These are not the same in *causation;* but the danger is in both the same,—stoppage of breathing by an obstruction in the windpipe. In choking, properly so called, the obstacle is within the throat; in strangling, it is from a cord, etc., outside of and around it; as in *hanging.* (For arrest of breathing by *charcoal gas*, etc., see **Suffocation.**)

Choking is most frequently caused by getting something "the wrong way" in swallowing. That is, what should go down into the gullet or swallowing throat (*pharynx* and *œsophagus*) gets into the windpipe (*larynx* and *trachea*). The windpipe is just in front of the swallowing gullet; the latter is next to the spine. When one laughs, or in any way breathes, while swallowing, this accident may happen. Even a drop of water going the wrong way, will cause a distressing spasm of the windpipe; but this is over in a few moments. Danger follows when a *solid* mass—as a mouthful of meat,—slips into the larynx; or when a large piece of meat gets stuck fast in the *pharynx* (gullet) so as to press on the *trachea* (windpipe) forcibly enough to keep air from being breathed through it into the lungs. Commonest of all, perhaps, is a fish-bone, or a chicken-bone, getting crosswise, so that it neither goes up nor down. Other things may slip into the windpipe. I know a lady whose health was impaired for years, with a threatening of consumption, by a little piece of gum-elastic, which she had in her mouth, getting into the bronchial tube; lower than the trachea, near one of the lungs.

No time is to be lost, when any one is choking. A long-fingered person should try to dip a forefinger at once into the throat as far as it will reach, to draw up and out the offending bone, or whatever it is. If it is a child, lift him up by the heels and slap him smartly, while in that position, between the shoulders. Children sometimes swallow pins; they stick, as bones are apt to do, across the entrance to the throat, pretty far up. Surgeons have long slender forceps and other instruments with which to seize such articles and withdraw them. All such things, everything except a piece of solid food in the swallowing throat, should be taken *out*, not pushed *down.* If time allows, a piece of wire may have a loop made in its end, and then be curved near that end, so as to be passed *down*, behind or below the obstacle, to draw it out. A proof that the thing is in the windpipe is obtained if the person can swallow a drink of water, yet has great distress and difficulty in breathing. This difficulty is great in *expiration* (out-breathing) as well as in inspiration. A physician being sent for immediately, in an urgent case, fatal suffocation being threatened, may find it necessary to *open* the larynx or trachea,

by an incision, in order to save life. If the immediate danger be passed, the question of such an operation may still have to be considered, when a foreign body remains in any part of the air-passages.

Strangling is best known in the form of *hanging*. In the latter, however, as used for the execution of criminals, dropping several feet under the gallows adds another cause of death; displacement of the bones of the upper part of the spinal column, crushing the spinal marrow. Simple strangling kills in two ways: arrest of breathing, and prevention of return of blood from the head to the heart; through pressure on the great veins of the neck. Either would suffice for the result; but the former is the quicker.

Hanging is a frequent mode of suicide. If any one is found hanging by the neck, hold up the weight of the body, and at once loosen the cord at the neck; cutting it will generally be the speediest way, if a knife is at hand. Then lay the person down, and, with as much fresh air around as possible, dash cold water lightly on the face (if it be in a warm place, on the bare *chest* also). Rub the arms and legs briskly, especially *upwards*, to favor the movement of blood in the veins, which is towards the heart. Heat a poker or flat-iron, not quite to a burning heat, but so that a hand cannot rest on it long with comfort; and touch that gently upon the pit of the stomach, and then draw it along down each side of the back. Apply mustard-plasters to the legs.

But all these things should be got ready and done by the *secondary* assistant or assistants. If a person cut down from hanging does not breathe, he should be laid on his back on the floor or ground, wherever he is, without loss of time. A roll of clothing, like a round knapsack, should be placed under his shoulders; and then *artificial respiration* should be attempted, by Silvester's method. See **Drowning.**

Dislocations. Displacements of bones at their joints. See **Joints, Dislocated.**

Drowning. One whole minute under water will, except with a few practised divers, end life in a human being. Still, by active means, those longer immersed, as much as five minutes, have been restored. We read in books of this having happened after fifteen minutes' immersion. This seems to me doubtful. But it is always worth while and right to give every drowned person the benefit of the doubt, and to work over him for at least an hour, even if no signs of life appear, before giving him up.

Drowning kills by exclusion of air from the blood in the lungs; water taking its place. Otherwise, the water, as such, is innocent of harm. This is said to be an easy mode of death. Those recovered from it describe it as a sort of dreamy sleep, followed by entire unconsciousness. We may as well remark here *how not to drown*, when in the water and not knowing how to swim. (Every boy and girl ought, however, very early in life, to learn to swim. It is not hard to teach one's self. The whole art of it is to *strike out*, slightly downwards and outwards, with the flattened hands and closed fingers, both arms and both legs, all at once, time and again, without loss of time by any unnecessary interval; keeping the mouth as high as can be all the time.)

In that case, there are two ways of doing. One is, to *tread water;* that is, to let the feet go down, and *tread*, rapidly, one foot after the other, as if working a treadmill; paddling in the same way also with the hands, one after another. Any one having confidence, as those have who have learned to swim, can keep this up with ease for a long time. Less exertion, however, is required for *floating*. In *sea*-water, which is heavy with salt, this is easier than it is in the fresh water of a river or inland pond. Still, it can always be done, if attempted right. Lie straight out on the back, with the arms at length by your sides, the mouth and nose out of water, the back of the head just under the surface; the toes just above or at the surface, the heels submerged. Then *paddle* gently with the hands. In any other position, the greater weight of the head makes it go down first, and drowning must result. Dr. Franklin, it is said, used to go to sleep floating on the water; so easy had habit made this position to him.

A person has been, we will suppose, a few minutes under water, and is dragged out. At once, on the spot (there is no time to take him anywhere else) lay him first on his stomach, and raise his feet a little higher than his head, for a few moments; some one at the same time pressing with moderate force on the sides of the chest. The object of this is to let water *flow out*, if it will, from the lungs. My belief in this is con-

firmed by what happened with a dog, which, with the intention of drowning it, I had held under water about ten minutes. As it seemed to be dead, I took it out of the tub, and threw it on the ground. This chanced to slope, so that the cur's head was lower than its feet. In about two minutes, the creature rose and walked away, none the worse for his ducking.

Fig. 252.

ARTIFICIAL RESPIRATION.

Next, lay the patient on his back, and put under his shoulders a roll of clothing, such as a rolled-up overcoat, a hard pillow, etc. Draw out his tongue, with a thumb and finger, and get some one to hold it until it can be fixed forward, to prevent it from falling back and closing the entrance to the windpipe. For this fixation, best will be a strong india-

Fig. 253.

ARTIFICIAL RESPIRATION.

rubber band. If none such is on hand, a paper-cutter, or a small stick, may be held upon the drawn-out tongue, pressing it against the lower teeth.

Now comes the effort to produce *artificial respiration.* Silvester's method is the best.

Stand or kneel behind his head, and take hold of his arms just above the elbows. Draw them both gently and steadily upwards, over and back of the head, at their full length; and keep them there for a second or so.* Then carry them back again to the patient's sides, and press the elbows firmly against his sides, for another second or so. Go on doing this, perseveringly, if necessary, for an hour or more. The object of it is, to promote expansion of the lungs to admit air, by the first movement; and its expulsion again, by the second movement.

Meanwhile, another assistant should cut the clothing so as to remove it, rub the skin dry, and cover the body with warm flannel. The legs may be rubbed briskly, *upward*, so as to favor the return of blood in the veins to the heart. Smelling-salts may be now and then held for a few moments under the nostrils. If a fire be near, heat a small flat-iron, or a poker or shovel, not quite to the burning point, but pretty hot, and touch it gently, again and again, to the skin over the pit of the stomach. This is a powerful mode of stimulation.

When natural breathing begins, stop the arm movements. Continue the rubbing, but also have hot bricks, flat-irons, or bags of sand or salt, bottles of hot water, or anything else warm, laid alongside of the patient's body, and put to his feet. Get him now upon a bed. Shortly, he will recover so as to swallow; and *hot milk* or *hot coffee or tea* will be better for him than anything else.

Having witnessed, at Atlantic City, some years ago, the drowning of two persons, who, after not more than five minutes of submergence beyond the breakers, were drawn out but could not be restored by the above usual measures, I have reflected a good deal on this subject of artificial respiration. It has appeared to me there ought to be some still better way of obtaining it. After various experiments, I have had made an *abdominal tractor;* a small hand-pump, to draw upon a large metal cup or bowl, placed upon the abdomen. The object of this is, to lift the contents of the abdomen away from the diaphragm (large breathing muscle at the floor of the chest; see Anatomy), and allow it free play in beginning respiration. This can be applied and used at the same time with the Silvester movements above described, and ought to assist them materially. So far, I have had no opportunity to give this apparatus a trial upon a drowning person.

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* The common direction is, for *two seconds.* I believe there is no advantage, but the contrary, in such slowness.

Ear, Foreign Bodies in. So disagreeable is the odor of the natural ear-wax, and so sticky is it to insects' feet and the bodies of grubs or worms, that they very seldom find their way into any one's ear; even when sleeping on open ground or in the woods. Once in a great while such a thing may happen. To get an insect out, let the person lie on the other side, and let some one pour in, slowly, cold water. Alarm may then cause it to back out; if not, before long the water will drown it. Then the larger part, or the whole (if it be not too soft) may be got out with a pair of ear-picks, or with a hair-pin bent into a scoop at its round end, or a piece of wire bent at one end into a small loop or ring. Particles still left can be washed out with warm water injected from a small syringe.

Children sometimes put peas into their own or one another's ears. Then, water should not be poured in; it would make the pea swell up and give more trouble. Careful use of an ear-pick or bent wire (as above), with a strong light thrown upon the ear-passage, will generally succeed in getting the pea out. A large hand-magnifier, such as is often used to look at engravings, etc., will help in this effort. If a shot has been put into the ear, pour in a teaspoonful of olive or almond oil, and then let the child be turned rather suddenly over, so as to cause the shot to roll or slide out.

Eye, Foreign Bodies in. Small particles, of sand, dust, cinders from a locomotive, etc., often get under the upper or lower eyelid; most frequently the latter. If the particle be very small, closing the eyes and blowing the nose hard several times, rolling the eyeballs at the same time, will be apt to work it, by aid of the flow of tears, to the inner corner of the eye; where it can be easily removed. To relieve another person of such an annoyance, first make sure where it is. Open the eye in a strong light, and draw down the lower lid. Use a magnifying-glass, if one can be got (a good thing always to have in a house). If you see the speck, a camel's-hair pencil (small paint-brush) will be the best thing to get it out with. Draw the brush *backwards* against it; don't push at it with the point of the brush. If there is no such brush at hand, the corner of a soft handkerchief may be used instead.

Should nothing be found under the lower lid, you must look under the upper one. Seat the person on a chair, and stand behind him; then, with his head leaning back, hold a lead-pencil or pen-holder in the right hand, and, drawing out the upper lid by its lashes, the patient looking downward, you lay the pencil along the lid and turn the latter up over the pencil. It is not difficult, with a little confidence, to do this with a finger instead of a pencil, and standing in front of the patient. While

the lid is turned up, look closely to find the intruding particle, and remove it with a brush or a handkerchief, as above described. The eyes must then be kept at rest, closed for awhile, to get over the disturbance; otherwise a troublesome inflammation may result. Quite often, when there has been a particle in the eye, but it has been rubbed out, there will still be left a *feeling*, exactly as if it was still there. When this is the case, a careful examination showing it to be so, the irritation will gradually disappear, if the eyes are kept quiet.

Pieces of stone or iron sometimes fly into the eyes and are lodged in the front of the ball. Their removal will require surgical skill. A powerful magnet may assist in getting out a fragment of steel or iron from the eye.

After all, to get a *movable* particle out of one's eye, the best way in most cases will be for the person to open both eyes in a basin of clean cold water; while they are open moving the head once or twice from side to side, so as to wash the particle out of the eye.

Fainting. One who faints, falls, unless held up, as when standing or sitting up in a crowded place. But not every fall is fainting. It may be an epileptic fit; but then the patient is *convulsed;* that is, his limbs, and perhaps the muscles of his face, *jerk.* There is a modified form of epileptic attack, not common, in which the sufferer lies still; in that, however, the *pulse* is not so weak as in *syncope* or fainting.

One attacked with apoplexy falls; but his flushed (or at least not pale) face, warm or hot head, slow and full pulse, and slow, snoring breathing, make the case clear. An intoxicated person, or one stupefied with opium, may be found lying unconscious. The odor of liquor in the former, and the contracted pupils of the eyes of the latter, usually serve for distinctions. (Odor of liquor on the breath, however, does not prove that the person may not have apoplexy as well as intoxication.)

In a faint, the face is pale, the forehead cool or cold, the pulse absent or extremely weak, the breathing noiseless and feeble. Once in a while we meet with mixed attacks; almost always in those whose hearts have undergone some degenerative change; in which there is a partial stupor, perhaps with snoring breathing, along with the other signs of fainting. Such an attack differs from apoplexy in that it soon passes off, and leaves no palsy after it. But such spells are comparatively rare.

Fainting is most common in young women; next so, in weakly old people of either sex. In these last it is most dangerous, and may in them easily end in death. What happens in a faint is this: the heart gives out, and sends no fresh blood to the brain; the brain fails, therefore, to maintain consciousness, and the person falls. This fall is advantageous, because it causes more blood to flow to the brain, and, consciousness being renewed, the heart also having less laborious work when the body is level, all starts again. A crowded and close room is a frequent place for fainting. Fright, the sight of blood, and other mental causes, as well as fatigue, may produce it, in those liable to it. Some persons never faint, through a long lifetime; others do so often, even on very small occasions.

What to do for fainting? Lay the person down at once. Get the crowd, if there be one, to move away. Open the windows, or carry the unconscious patient (horizontally) out into the fresh air. Sprinkle cold water on the face; loosen everything about the neck and chest; hold smelling-salts, for a moment at a time, under the nostrils. An ordinary syncopal attack will thus soon pass away.

Fractures. *Broken Bones.* Most frequently broken is the *radius;* the thumb-side bone of the forearm, which is most closely connected with the hand. We may break it by falling on the hand with force.

In the same way also the *ulna* may be fractured; the other bone of the forearm. Next often broken is the bone of the *arm* (humerus) above the elbow; and frequently also the *clavicle*, or collar-bone. After these (besides fractures of the *fingers*), come fractures of the larger bone of the leg (*tibia*, shin-bone) below the knee; the thigh-bone (*femur*); of the ribs; of the knee-pan; and of the nose, lower jaw, and skull.

We know a bone to be broken by the change in its shape; the pain caused by every movement; and the crackling noise (not loud), and crackling feeling to the touch, produced when the parts are moved. A broken limb is generally shortened; the muscles above and below the place of fracture drawing the two pieces so as to overlap each other. When the break is near a joint, it is sometimes difficult to be sure whether there is a fracture or a dislocation. This difficulty is much increased when swelling and inflammation follow, some hours after an injury. In examining to determine a change of shape in a limb, always compare it with its own fellow, on the opposite side of the body. The two are almost sure, when sound, to be alike; and if not so after one is hurt, this will help us to an understanding of the case. There is a change of shape also in *dislocations;* but in them the bones cannot be moved without great resistance; there is no crackling (crepitation) heard or felt; and when the bone is put back to its right place, it will stay there.

The most serious fractures are those called *compound* fractures; in which there is a wound of the flesh, communicating with the broken ends of the bone. Sometimes one end of a fragment is forced quite out through the skin.

In the *treatment* of fractured bones, the two aims are, to get the broken parts into their right places again, and to keep them there until they "knit together." This takes place by a natural process of growth, exactly like that by which a wound is healed on the surface of the body. A thick colorless fluid, *plastic lymph*, is poured out around and between the ends of the fragments of the broken bone. Gradually this fluid is, between those fragment-ends, changed to gristle (cartilage); and, in time, that gristle becomes solid bone. In one bone, when broken, the *knee-pan* (*patella*), it seldom gets beyond the stage of gristle or cartilage; because that bone, from its situation, receives too little blood to enable it to grow or repair so well as other parts.

Putting a broken bone back to its right shape is called "setting" the bone. This is done, in most instances, by *stretching* the limb, so as to overcome the shortening action of the *muscles;* and at the same time *adjusting* the fragments by proper pressure near the place of fracture. After this has been effected, as nearly as possible, some means are needed

to *hold* the parts in the same position. For this, *splints, bandages, adhesive plasters*, etc., are used.

No unprofessional person should venture, if avoidable, to carry out the treatment of a broken bone without the aid and direction of a surgeon. It often happens, however, that, at the time of an accident, no professional assistance can be obtained. It is therefore desirable that, besides the above general statements, something should be here said of the "first aid" required in the fractures most likely to occur.

Forearm. Most often the *radius*, sometimes both it and the *ulna*, suffer fracture from a heavy fall forward on the hand. Except at the *elbow* and at the *wrist*, there is seldom difficulty in ascertaining the nature of this injury. Make a couple of splints of thin wood, or thick pasteboard, or binder's-board, each rather wider than the forearm, and long enough to reach from the elbow to the tips of the fingers. Lay along on one side of each splint a layer of cotton; and, while one person grasps the hand of the patient, with his *thumb upward*, and draws moderately upon it, put the splints one on the front, and the other on the back of the forearm. Then put on a *bandage*, about two and one-half or three inches wide, over the splints; beginning near the hand end, and turning and reversing until the whole length of the splints has been covered. This bandage should be *firm*, but not uncomfortably tight. I knew one case in which mortification took place from an excessively tight bandage on the forearm. When the doctor comes, he will examine and probably readjust the splints, and see to the farther care of the case. When the splints have been applied, however, the arm should be placed in a *sling*. That is, a large handkerchief, or a bandage, should have its ends tied together, so that, when it is hung over the back of the neck, the hand may be slipped into the loop; the limb will be thus kept at rest in one position. On lying down, take away the sling, and lay the injured arm at ease on a pillow.

Fig. 254.

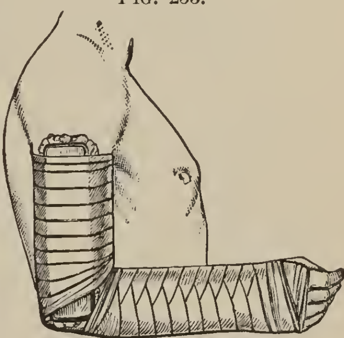
A SIMPLE SLING.

If it be necessary in any case to take care of a broken forearm or arm without a surgeon, one thing to remember is, that the *fingers* should be

moved (bent and extended) every day or two, at least after the first week, to prevent their becoming stiff and useless. Near the end of the time of treatment, say after three weeks, the splint on the palmar side may be so shortened as to allow the fingers to be bent over its rounded end; and the patient should then be sure to give them such exercise several times daily, to keep their muscles in condition.

Elbow and *wrist* injuries are so difficult of management that I hesitate to endeavor to specify particulars concerning them, as they will engage all the skill of the trained practitioner. Good sense, with presence of mind, will be likely to suggest whatever addition to the above first treatment will be safe while waiting for professional advice. I may merely add that the reason for not putting a bandage over the broken forearm *before* putting on the splints, is, that the difficulty, in fracture of the radius or ulna, is, to *keep the two bones sufficiently apart;* and a bandage *alone*, or one *first* applied, would force them too close together. There is no danger of their being pressed too far apart.

Fig. 255.



BROKEN ARM IN SPLINTS.

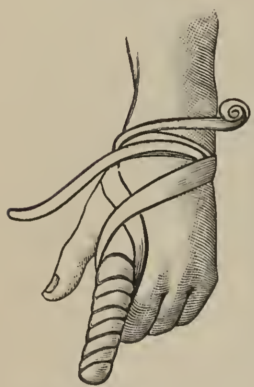
Arm. The most common fracture of the humerus is not far from its middle; more troublesome, is a break near either end. The first of these is easily recognized, by the *pain, mobility* at the place of the break, and *crackling* on motion, to the touch if not to the ear.

An *angular splint,* one piece from armpit to elbow, and the other at right angles with this from elbow to ends of the fingers, will be here serviceable; also, *three short* splints, of the length of the arm, from shoulder to elbow. *First,* however, the whole arm should be *bandaged;* from wrist around the hand, then up over the wrist and forearm (the arm held at *right angles* at the elbow) and the arm, to near the armpit and shoulder. The bandage should be *evenly* and *firmly,* but *not too tightly* applied. If no splints can be immediately obtained, a thin twelvemo book, of one hundred to one hundred and fifty pages, may be padded with cotton and placed under the arm to the armpit. Then pass a wide bandage (three to four inches) around the arm and body; the forearm being held against the chest with the thumb upwards. This will do to keep the injured arm at rest till proper surgical aid arrives.

When a *finger*-bone is broken, its treatment is simple enough. Straighten it out, and put on its front and back small splints cut from a cigar-box, or made of thick pasteboard, or the back of an old book,

ete. Stieking-plaster will here be more convenient than bandage, to retain the splints in plaee.

Fig. 256.

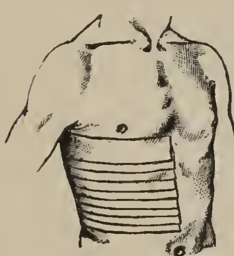


FINGER BANDAGE, AND FIGURE OF 8.

Collar-Bone. This fraeture is not an easy one to manage sueeessfully. A number of kinds of apparatus have been invented and are used for it. The "indication," as doctors eall it, is to press and keep the *shoulder upwards, outwards,* and *backwards.* The natural tendency, when the clavicle is broken, is for the shoulder to *fall;* the ends of the broken bone tilting up near its middle. Having seen a good many broken elavieles in hospital and private practiee, my deliberate advice to the unprofessional good Samaritan is, to get his patient who has suffered this aecident *to bed, on his back,* to lie there as still as he can until the doetor comes. In justification of this adviee, it may be added, that some very good eures of fraetured eollar-bone have been obtained by this method alone, carried out until the bone united.

Ribs. We know a broken rib ehiefly by pain in breathing, moving, or pressing on the seat of fraeture. There is little displacement, one rib acting as a splint to its next neighbor. A *bad* rib-fraeture may involve the pressure of a fragment-end into the lung; when there will be spitting of blood and mueh trouble. Commonly, fraeture of a rib is one of the easiest of accidents to treat.

Fig. 257.



DRESSING FOR FRACTURED RIB.

The old method, of enveloping the whole ehest in a *broad* (four-ineh) *bandage,* answers very well indeed. The idea of it is, to *keep the ribs at rest,* the patient breathing almost entirely *by the diaphragm* (abdominal respiration). Reeently, surgeons generally prefer *adhesive plasters;* a number of them, moderately wide, being sueeessfully applied *only on the injured side* of the chest. Under either method, while the patient may not need to remain in bed, he should move about very slowly, using his arms but little, and doing nothing to hurry respiration. A broken rib will *knit* in about four weeks. A *radius* or *ulna* fraeture will be well usually in about the same time, or less; a *humerus* or *clavicle* in seareely more. A broken *leg* (*tibia* or *fibula*) is commonly well in a month or so; a *thigh* (femur) will require eight or ten weeks for security.

Nose. One or both of the small bones of the nose (see **Anatomy**) may be easily broken by a blow. The change of shape of the nose may then be seen and felt, until swelling makes everything obscure. Immediately after the injury, or, if that has been neglected, then after the inflammation has subsided (under lead-water application and twenty-four to forty-eight hours' time), endeavor should be made to *adjust* the fragments aright. If this cannot be done from the outside alone, grease with tallow or oil a slender lead-pencil, or the tapering end of a wooden pen-holder, and very gently push it up the nostril on the side which is depressed. After so restoring its shape, if it does not stay so, insert a small roll of cotton, well anointed with oil, tallow, or vaseline, to act as a soft splint. This should be changed every day as long as it is used.

Lower Jaw. This may be broken by a violent blow. The *line of teeth* may be easily examined and found broken; and the movement at the seat of fracture will be seen and felt.

To *set* a broken jaw is not difficult; but more pains will be needed to keep it right until the bone knits, which happens in from two to three weeks. All food must be liquid, and introduced by means of a quill, or through a glass tube between the teeth. The jaws must be closed together evenly, and bound so. The required bandage is one under the chin and over the top of the head. To retain that in place, another bandage around the forehead and back of the head should be put on, and secured to the first over the forehead by pins. This simple apparatus will answer at least till the doctor comes.

Fig. 258.

BANDAGE FOR BROKEN JAW.

Thigh. The thigh-bone may be broken in either of several places. Old persons are especially liable to fracture of the *neck* of the bone, near the hip-joint. The shock to them is so great as to be often fatal in result. Yet I have known two women over eighty to recover from this accident; always lame, however, as *bony* reunion seldom occurs under such circumstances.

In younger persons, the commonest fracture is not far from the middle of the femur (thigh-bone); and *oblique,* so as to cause considerable shortening, by action of the muscles. *Treatment* of this requires surgical skill and care; with the best of which, from a quarter of an inch to an inch and a half of shortening will sometimes remain. This will not prove of much inconvenience. Indeed it is quite common for the two sound limbs of a person to differ half an inch or more in length.

If an old man or woman (seventy years or more of age) falls and lies

helpless, with the toe of the injured limb turned outward, and much pain at the hip on moving that leg, even if no crackling is heard or felt with that motion, and with very little shortening of the limb, it is most probably a fracture of the neck of the thigh-bone. Carefully lift such a one, one person taking charge of the injured limb, and two others the head, shoulders, and feet; and lay him or her on a bed. Make the hurt leg as straight as it can comfortably be, upon a pillow laid lengthwise. Then wait until professional advice can be had as to whether any apparatus is worth while or not in such a case.

Should it be necessary, in the absence of a surgeon, to do something for a fracture of the thigh-bone in the course of its *shaft* (easily known by the *deformity*, *pain*, and *crackling* on moving the limb), the same care will be necessary in getting the patient to bed, with a pillow lengthwise under the broken thigh; if comfort seems to require it, another

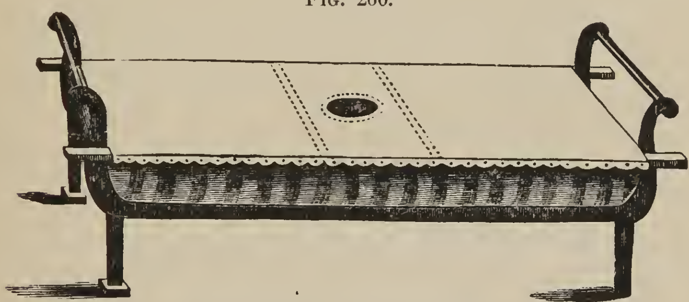
FIG. 259.

EXTENSION FOR FRACTURE OF THIGH.

pillow also under the leg and foot. Then pass long and broad strips of adhesive plaster in long spirals up the sides of and around the leg, as high as the knee (bandages will do if there is no plaster at hand), and make a loop of them below the sole of the foot. Attach a cord to this loop, and carry it over the foot of the bed, or over a piece of smooth round wood fastened there for the purpose; and to the lower end of the cord attach a *weight;* from four to ten pounds, according to what the patient bears without complaint. To *stretch* the limb as fully as possible, draw him up by the shoulders, with some force, towards the head of the bed. The purpose of the weight is, to keep the limb all the time as much extended as it will bear, so that the bone will knit with but little shortening. If the thigh is broken *straight across*, instead of obliquely, and the fragments are set in place, end to end, there may be no shortening at all. Further to protect the broken limb from being

moved out of shape, we want a simple *splint*. For this, cut a piece of gutta-percha, if it can be had, just long enough to reach from the fold of the buttock to the bend of the knee, and wide enough, when bent over, to cover about half the thickness of the thigh. Soak this piece in hot water until it becomes moderately soft and flexible. Then fit it, by pressure, to the shape of the under side of the *sound* thigh, which can be raised for the purpose without disturbing the injured limb. Put a not very thick layer of cotton inside of this splint, when it cools and hardens, letting the cotton overlap the upper and lower ends of it, to protect the skin there from rubbing. With great care, raise the broken limb and adjust this splint under the thigh; and secure it by passing around it and over the thigh several pieces of wide tape or narrow bandage, which may be tied with moderate tightness above the thigh. If gutta-percha cannot be obtained, felt, binder's-board, or two or three layers of thick pasteboard, may be used in nearly the same way, but

Fig. 260.



DR. HAMILTON'S FRACTURE BED.

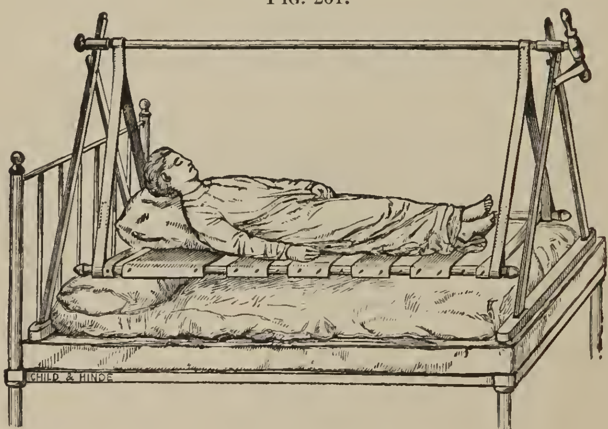
with less advantage. There are other ways of treating fractured thighs, with splints, inclined planes, and so forth, which you will find described in works on surgery; but the above is the simplest, and will do all that is likely to be well accomplished by unprofessional hands. One of the difficulties in treating this fracture is, arranging for the patient to have his bowels moved. For the bladder, a *urinal* will answer, with very little disturbance. The most complete way is to have a *fracture bed;* with a round or square hole in the bedstead, having a dropping lid below, and a corresponding movable piece cut out of and fitting into the mattress, near its middle.

Eight or ten weeks will generally be required after a fracture of the thigh before the patient can venture safely upon his feet. During that long time, much care must be taken to avoid *bedsores*, especially in a thin and weak person. Wherever there is constant pressure, the skin ought to be bathed every day with whisky or soap-liniment. If any

redness or tenderness appear, put on the part two layers of adhesive plaster, smoothly applied, or a piece of soft buckskin spread with soap plaster. Air-cushions, water-cushions, or small pillowlets made for the purpose, are often used, and have advantages; but the double artificial skin made by adhesive plaster will seldom fail to give protection to a tender part. It is worth while to repeat here that shortening of the thigh of as much as an inch permanently will not cause any great inconvenience. A patient of mine who recovered with at least three quarters of an inch of unavoidable shortening, when I saw her a year afterwards, had forgotten which limb it was that had been broken.

Knee-pan (*Patella*). As already said, this is a very undesirable bone to have broken; it is so nearly impossible to have it knit solidly again. A fall upon the knee may fracture it; but it is quite as often broken

FIG. 261.



INVALID LIFT.

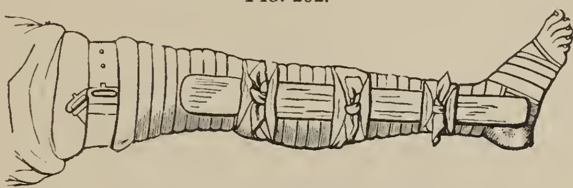
by a sudden and violent strain of the powerful muscles of the thigh attached to it; as in making a great endeavor to avoid falling backwards. A tall and active man, who became my patient, thus broke his patella in trying to save himself from a fall in skating.

It is usually easy to make sure of the existence of this fracture, as the bone is small and covered only by skin, if it be examined immediately after the occurrence of the injury. When swelling and inflammation have come on, there is sometimes difficulty. Always, however, the leg is disabled from motion, every effort giving much pain; and, in the absence of swelling, the *separation of the two pieces* is observable,—unless it be (exceptionally) a lengthwise, up and down, instead of a cross or horizontal fracture.

To *treat* this injury, the leg must be kept out *straight*, on a well-

cottoned long splint, reaching from below the hip to beyond the heel. Then "figure of eight" pressure is wanted, to draw the two fragments (in horizontal fracture) as near as they will come together. If anything is tightly bound directly around the knee, it will check the circulation of blood in the limb more than is safe. But with the wooden splint beneath the knee, we may cause a great degree of pressure *above* the

FIG. 262.



BANDAGE AND SPLINT ON LEG.

limb, putting whatever is used *around the splint* below. Adhesive plasters will be more reliable for this purpose than a bandage. One strip of Martin's (or Grovenor & Richards) surgeons' adhesive plaster, which is elastic, may be put obliquely over the leg *just below* the knee-pan and around the splint; and another strip *just above* the patella, and obliquely downward, being secured to the splint underneath. Then fix the whole limb to the splint with a long ($2\frac{1}{2}$ or 3-inch wide) bandage, beginning below and wrapping it upwards as far as the upper part of the thigh.

Leg. The larger bone of the leg (*tibia*) is much more frequently broken than the more slender outer one (*fibula*). A simple fracture of the tibia is easily discovered, by the change of shape, pain, and crackling (crepitation) when it is moved at the part broken. In *treatment* of it, if a doctor is expected, merely lay the patient on a bed, and place the limb (stretching it with moderate force by drawing upon the foot, if it seems shortened) on a pillow. Then pass around the pillow and leg several pieces of broad tape or narrow bandage, tying them in bow-knots above the leg. If no surgeon can be obtained, it will be well to have a simple *fracture box* made, in which the leg will rest on the pillow with more security. For this, it needs a piece of wood a little longer than the leg (from the knee down) and also a little wider than it, to lie *under* it; also two pieces of the same length and of about the same width, to make *sides* to the box. These should be attached with *hinges* to the under piece, which last is the bottom of the box. Lastly, a *foot-board* should be made to stand up

FIG. 263.

A FRACTURE BOX.

from the lower end of the under piece, being securely fastened to it. This is to steady the foot, when the sides of the box are brought up against the pillow on which the leg lies at rest. Narrow bandages may then go under the bottom of the fracture box and around it and the leg, to be tied above; and a handkerchief or bandage will keep the foot with sufficient firmness against the foot-board. *Shortening* is not common from fracture of the leg, if it be well drawn down and "set" in the first place. Extension of the leg can be practised, if necessary, by means of a weight and pulley over the foot of the bed, as for fracture of the thigh; but it is seldom required.

Fracture of the smaller bone of the leg (*fibula*) is hard to ascertain, and more difficult to manage. This bone is the one that connects with the *outer* side of the ankle (side of the little toe; the great toe being on the inner side). There it can be felt, and, if broken, there will be some change of shape; more motion, though painful on pressure, than in the sound limb at the same part; and more or less crepitation or crackling, felt if not seen, when such motion is made. If a surgeon cannot be had, which is very desirable, to treat this fracture, have a wooden splint made, a little longer than the leg, and of about its width. Pad it rather thickly, but evenly, with cotton, fastened to it by means of a bandage; lay this splint along the *inner side of the leg*, from just above the knee to just below the foot, and bandage the splint to the limb, from below upwards, as firmly as can be borne with comfort. This will be likely, if readjusted carefully from time to time, to promote the union of the bone without serious deformity or lameness.

Fractures of the leg are often treated by surgeons with a dressing of splints and bandages soaked in a *plaster of Paris* mixture, or a solution of *silicate of sodium* (soluble glass); which becomes fixed, like wood or stone, so as to keep the bones in place even while the patient is walking about. But such applications require more judgment and skill than ordinary splints and bandages, and had better never be undertaken by unprofessional persons. We refer for the account of them to works on Surgery.

Bones of the *foot* (*tarsus, metatarsus,* and *digits;* see **Anatomy**) cannot well be broken without great violence. This being the case, apparatus is seldom in place in their treatment. Such injuries will be considered under bruised and crushed **Wounds**.

Compound fractures are those in which an end of the broken bone projects through the skin; or, in some other way, a wound is made, communicating with the seat of fracture. They are much more serious and difficult to treat than simple fractures. If such should occur where no surgeon can be obtained for a considerable time, the patient should be

put to bed, and a *fracture box* should be made, whether the bone broken be an arm or a leg. Let this box, instead of containing a pillow, be half filled with clean *bran* or fine *sawdust;* and lay the injured limb, as straight as can be, in that material. Every day the wound near the fracture should be examined. If a discharge of matter (pus) occurs, very gently remove the bran or sawdust which has been soiled by it; washing the wound at the same time carefully with a little lime-water. Very good cures have often been obtained, of compound fractures treated in this manner.

Skull fractures will receive attention shortly, under **Head, Injuries of.**

Hanging. See **Choking.**

Head, Injuries of. Cuts and bruises of the scalp will be spoken of under **Wounds.** Blows on the head may be followed by either of two results: *concussion* or *compression* of the brain. Concussion is simply *shock.* A person falls and strikes the head. He is "stunned," and lies unconscious. His breathing is natural, his pulse feeble and rather more rapid than usual, his face pale. On shaking or speaking to him, he may be partly but not entirely roused. *Let him lie still,* in a warm place. Probably in a few minutes, possibly longer, rarely after several hours or even days, he will recover consciousness. Then, especially with a child, there is some danger, which is not over for at least two weeks, of *inflammation* of the brain following. Therefore, any one stunned in such a way should be kept very quiet in mind and body for two or three weeks after the injury; even if no unfavorable symptoms appear.

Again, some one falls and strikes the head, very hard, or receives a violent blow upon it. He lies unconscious, *snoring* with deep, slow breathing; with a slow and full pulse, face flushed, and head warmer than natural. We infer that he has *compression* of the brain. This may result in either of two ways: the *skull* may be *broken,* and a piece of it may be pressed down upon the brain; or a *clot of blood* may be formed where a blood-vessel has been ruptured. In either case, it is *pressure* on the brain which causes the stupor (coma). It is true, and important to be remembered, that the same sort of coma or stupor, with the same signs, may be caused in other ways. A man dead-drunk is in a state of coma. His breath will smell of liquor, and his whole "make-up" will mostly show his history. *Poisoning with opium* (as laudanum, or morphia) produces a closely similar *narcotic* coma. Such a one will, if his eyelids be open, be seen to have his *pupils contracted.* Lastly, *apoplexy,* without any blow or heavy fall, gives the same symptoms; *pressure of blood* on the brain existing in an attack of that disease; from either excess of blood *in* the vessels, or its escape from the vessels, forming a *clot.*

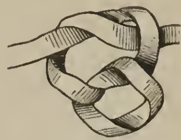
When, then, a person has not been seen or known to fall, but is found lying in a condition of stupor, from which he cannot be roused, all these possibilities are to be remembered. Examine his head, with your eye and hand, all over. If any bruised spot be found, cut the hair there very short, in order to make a more thorough examination. You may find a depression, or an inequality, showing a fracture of the skull; or, with evidence of a bruise, no *break* may be discovered, and yet the *inner,* more *brittle* plate of the skull may be fractured; or the *jar* may have extended elsewhere, making a crack (by "contre-coup," as the

French call it) in the base of the skull. A symptom of this, sometimes seen, is bleeding from the ears.

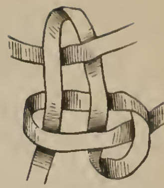
What to do? Lay him on a bed and let him lie still. It is a grievous mistake to suppose that you must not let a person sleep when he has had an injury of the brain. *One case only,* with somewhat similar symptoms, requires opposite management; namely, the stupor of *opiate* or other narcotic *poisoning.* When sure of *that* being the matter, it is right to keep the patient awake. (See **Opium Poisoning,** later in this book.) If there be a fracture of the skull, or compression of the brain by a clot of blood, the treatment proper is of a kind unsuited to non-professional hands. A surgeon should be had as soon as possible. In a clear case, he may *lift up* the depressed fragment of bone; or perhaps, with a *trephine,* may remove a small round piece of the skull so as to take off pressure. Life has in a number of instances been thus saved: although it is one of the most precarious of surgical operations as to its results. It is wonderful how slight a blow, in some cases, will destroy life; and again, what terrible-seeming injuries of the head may be survived and recovered from. A man in Maine was famous some time ago for living twenty years after an iron rod was, by an explosion, driven clear through his head; and a distinguished physician lately lived in Philadelphia who, after being struck down by an unruly horse, had twenty-three pieces taken out of his frontal bone, where it was fractured. I had under my care in the Pennsylvania Hospital a carter who broke his head by a fall while drunk. Four ounces of brain came out at the place of fracture, where there was a ridge five or six inches long. Yet he recovered; and seemed about as good (or good for nothing) as before.

FIG. 264.

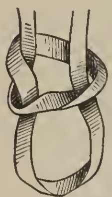
SINGLE KNOT.



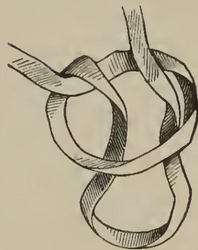
DOUBLE KNOT.



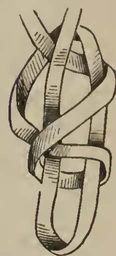
WEAVER'S KNOT.



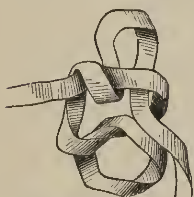
SINGLE SLIP-KNOT.



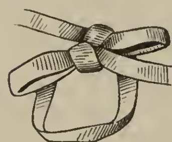
SINGLE SLIP-KNOT.



CROSSED SLIP-KNOTS.

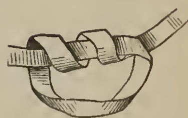


SINGLE BOW-KNOT.



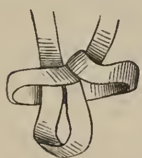
DOUBLE BOW-KNOT.

Used for fastening the muslin strips around fracture apparatus, and the threads securing the little bandages about the fingers and toes.



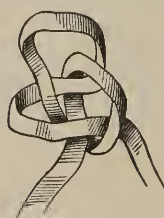
SURGEON'S KNOT.

Employed when a thread is tied around an artery.

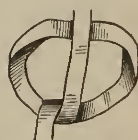


LOOP KNOT.

Will answer to arrest the venous circulation during venesection, and enables the operator to graduate the compression instantly and accurately.



DOUBLE KNOTTED AND LOOPED KNOT.

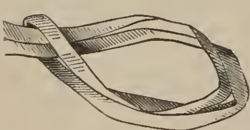


PACKER'S KNOT.

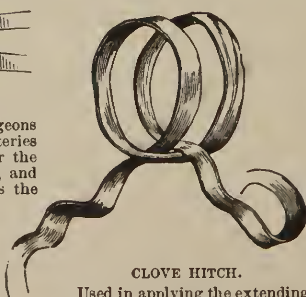
Is the one formed over the temple by the knotted bandage of the head.

REEF OR SAILOR'S KNOT.

Is the one mostly used by surgeons of the present day for ligaturing arteries instead of the surgeon's knot, for the reason of its less liability to slip, and the certainty with which it closes the arterial canal.

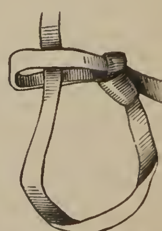


DOUBLE NOOSE.



CLOVE HITCH.

Used in applying the extending bands for the reduction of dislocations, consists, as seen in the figure, of two packer's knots laid together.



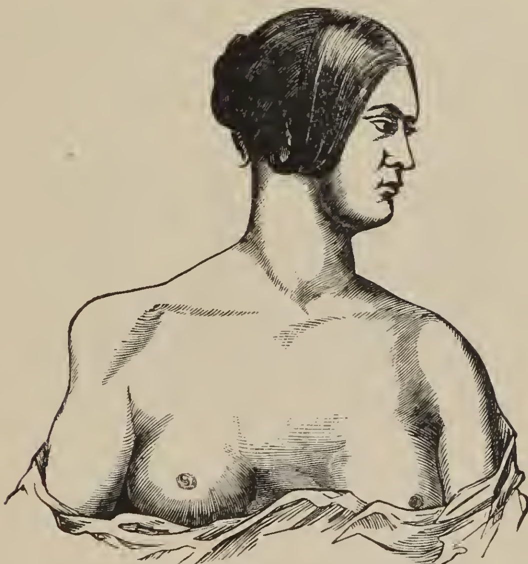
SINGLE NOOSE.

Employed to secure the hands and feet of a patient about to undergo the operation of lithotomy, etc.

Joints, Displaced. *Dislocation* is the common name for a "bone being out of joint." Most common of dislocations are those of the *thumb* or *fingers;* next, perhaps, of the *jaw;* then of the *shoulder;* next, the *thigh,* at the hip-joint. In hanging, or on falling headlong, dislocation of the *head and first vertebra of the spine* may occur; being usually called "breaking the neck."

The *jaw* is sometimes knocked out of place by a blow, but is more often dislocated by being *opened too widely,* as in yawning or scolding violently. It then stays wide open, and the mouth cannot be shut. To get it back, some one must wrap his two thumbs thickly with handkerchiefs or something else to *protect* them. Then place one thumb upon

FIG. 265.



DISLOCATION OF SHOULDER.

the back teeth on each side, the fingers coming under the patient's chin. Press the *jaw* forcibly downwards (and a *little* backwards) with the thumbs, while the *chin* is at the same time *raised* by the fingers of the two hands. This will bring the jaw into its place; and as it begins to come, slip the thumbs out, to avoid the snap of the teeth upon them.

Dislocation of a *thumb* is not uncommon; especially with the thumb pointing backwards. To restore it, we want to lift the round part of the thumb-bone over the slight ridge of the hand-bone (*metacarpal* bone; see **Anatomy**), at the same time drawing it forward to its place. This may require a good deal of force in the case of a strongly-knit person; but *tact* or management is of great value in reducing dislocations. The

skill of "natural bone-setters" is no doubt exaggerated; but there is a difference in "knack" in such matters, which may be improved upon by close observation and practice.

Finger dislocations are to be dealt with in the same way as those of a thumb. The sooner the reduction is undertaken the better; as, in a little time, swelling and inflammation will make it difficult. Having once dislocated the middle finger of my right hand by a fall in getting out of a horse-car, I pulled it at once into place, upon getting up, before reaching the side-pavement. An hour later, it would have given considerable trouble.

The *shoulder* is not infrequently dislocated. This may happen in several different directions, according to the *position of the arm* and the *direction of the force* acting upon it, when the accident happens. Always, however, we may know a shoulder dislocation by the *depression at the shoulder,* where it is naturally rounded out, under the deltoid muscle

FIG. 266.

SELF-REDUCTION OF DISLOCATION.

(see **Anatomy**); and by the constrained position of the arm, which cannot be moved without difficulty and pain. Often the round head of the arm-bone (*humerus*) can be felt in its wrong place; in the armpit, or more forward, nearly under the collar-bone. If a surgeon cannot be had, it will be well for a strong person to try to reduce such a dislocation; as, if long left, the parts adhere together, and the difficulty of restoration is much greater. The way to do it is this: let the patient lie down on the floor. The operator, taking off a shoe, should sit down with his feet towards the head of the patient, and place his stocking-foot in his armpit. Then let him grasp the hand and wrist of the dislocated arm, and draw it forcibly towards himself, and somewhat inward towards the patient's body. After thus pulling it out as far as he can, *let it go suddenly.* It will then generally slip into its proper socket. The arm should then be carried in a sling for a week or more, for the strained ligaments to heal.

Thigh dislocation is a much more serious accident to deal with, as may be supposed from the force necessary to displace so large a bone at so strongly protected a joint. The head of the thigh-bone (*femur*) may be pushed or drawn into either of several places; in which it may in many instances be felt and perhaps seen as an unnatural swelling of the part. The limb cannot be moved without great difficulty and pain; but there is no crackling (crepitation) heard or felt when the attempt to move it is made, as there is in fracture of the bone. The toes of the injured limb are turned *inward* in all but one variety of hip dislocation (turned *outward always* in *fracture* of the thigh); and in dislocation the *fixedness* of the limb distinguishes it from fracture.

Formerly, surgeons always resorted to great force in reducing dislocations of the thigh. I remember the pulleys and ropes in the hospital as used in my student days, reminding one of the rack of the Spanish Inquisition. Yet it was not cruel, because, when successful, as it usually was, it relieved the patient of a disabling lameness. In latter times, a more satisfactory method has been devised, of coaxing and working the bone into its place by skilful manipulation. The surgeon knowing well the anatomy of the bones and joints, ascertains by examination which way the head of the bone was forced (through its capsular ligament) *out* of its socket; and then he *manœuvres*, by movements of the limb, to reverse that direction and get it in again. No one, however, not familiar with anatomy, will, unless he be indeed a "natural bone-setter," be likely to attempt so considerable an operation. It may be remarked, also, that some of those who, without real knowledge, claim to have the art or knack of bone-setting, have been known to break bones or do other harm by injudicious violence.

Dislocations of the *elbow*, *wrist*, *knee*, and *ankle* are produced only by great degrees of violence; and are therefore injuries which demand scientific professional skill for their management; especially as they are often complicated with fracture of the bones near the joints. We must therefore leave them to books and practitioners of Surgery.

Dislocation of the *neck* is almost always instantly fatal. Not quite always. In the Journal of George Fox, the founder of the religious Society of Friends, he tells that while travelling on horseback in this country, a companion was thrown from his horse on his head, and lay as though dead. Fox went to him, and finding his neck "limp," took hold of his head and gave it a good stretching pull. This brought it right; and the good man got on his horse again and travelled several hundred miles with his strong-minded and strong-handed benefactor. Professor S. D. Gross, of Philadelphia, is said to have had the good fortune and skill to save the life of a man whose neck was dislocated.

Few indeed, however, are the cases where any skill would avail; as the spinal marrow is generally crushed by the "process" of the second or axis vertebra. (See **Anatomy.**)

Joints, Sprained. Any of the joints may be wrenched or sprained, without actual displacement. This happens often with the ankle, knee, wrist, elbow, fingers, etc. The ligaments are then stretched, and some of their fibres may be torn or broken. Hence follows more or less inflammation, and lameness until the ruptured ligaments have time to heal again. Since the "fibrous tissue" of which they consist has only a low grade of vitality, and not much blood is given for nourishment of the joints, this process of repair in them is slow. A sprained ankle or knee may be longer in getting well than a broken leg would be. At least this is apt to be the case unless the sprained joint has given to it the best chance possible from the first. This is to be had by the patient giving up to rest it completely as soon as it is hurt. Thus inflammation may be averted or kept low, and a moderate sprain may get well in a few days.

A sprained *ankle,* then, should be kept still from the very start; which requires that the patient should not walk upon it. Best for it will be, remaining in bed; as all movements out of bed, even when the foot is kept from the floor, will *jar* the joint more or less. Of course this *total* rest will seldom be long needful.

If the joint be very much *swollen, hot,* and painful, *cool* applications, as lead-water and laudanum, will be good for it. Two dozen American leeches may be applied to it; their bites being encouraged to bleed after the leeches drop off, by warm wet cloths laid on. Otherwise, the effect of the leeching may be to draw as much more blood into the swollen part as they take out of it.

If the swelling is moderate, and the heat of the joint not great, *warm* applications, or even cloths wrung out of *hot* water, will give the most comfort. Indeed there is no dogmatic rule to be laid down about hot and cold applications for inflamed parts of the body. Whichever gives the most relief will be the best in any case.

Bandaging is the next thing in the treatment of a sprained ankle. This will give support and take down or keep down swelling. A two-and-one-half-inch muslin bandage will answer for an adult; two-inch for a half-grown person. Begin by passing an end of the bandage around the *ankle;* then, with the *fingers,* not the thumb, *in* at the *roll-side* of the bandage, turn it down over the foot, smoothly, reversing it obliquely to avoid projecting wrinkles. Around the foot twice or more, and then obliquely around the ankle again. *Firmness* should be the

aim, without uncomfortable tightness; if too tight, it will do harm rather than good.

A sprained *knee* will, still more imperatively, require absolute rest from the start. Its lameness, if protracted, will be a worse inconvenience than that of the ankle; and either may, if neglected, be an affair of months, or even years. The treatment otherwise of a sprained knee, should be conducted upon the same principles as that above mentioned for a sprained ankle. With either, when it is getting well, there should be a gradual return to its use; trying it, at every step, and giving up the movements if they make it worse again. Here "a day in time saves nine." Slow recovery, from the sluggish circulation and nutrition of the part, may be hastened by bathing the joint with soap-liniment; also by pouring upon it a stream of hot water several times every day. With vigorous persons, in summer-time, the tonic effect of a stream of cold water for a few minutes at a time seems to answer a still better purpose.

Sprains of the elbow, wrist, fingers, etc., should be managed in the same way as the above. It is wonderful how long after a sprain of any joint it may continue to be weak and sensitive on motion.

Lightning-Stroke. A shock of electricity from a cloud which will shatter a large tree, will of course destroy in a moment the life of a man. Even the "dynamo" machines now used for electric-light currents generate power as fearful, almost, as that which Dr. Franklin drew with his kite from the skies. A wire from an electric lamp, fallen in a street of New York, was trodden upon by a horse. The animal fell dead at once; and the same thing happened again, before the current was disconnected for safety and repair. But there are all degrees of electrical quantity and intensity, and moderate as well as severe shocks, even by lightning. The subject of protection from lightning is outside of the scope of this work. It may be said, merely, that the object of lightning-rods is, to carry electricity through a good metallic conductor, down into the earth, instead of allowing it to pass through the house. Its rapid passage through the conductor happens without violence; in the house, interruptions of various kinds cause damage to people and things in its way. A lightning-rod then must reach higher than the house, and had better have a number of points to receive the electrical excitement. Then it must have no gaps on the way down to impair its rapid conductivity; and it must be well connected with the earth; best of all with a well or reservoir of water. A tin or other metallic roof does not draw the lightning, or in any way increase the danger from it. Rather, it diffuses the discharge, which is perilous in proportion to its concentration. It is advantageous, however, to have several lightning-rods to every large house, with which the metal roof may be connected at its lowest parts. In a house, the safest place during a thunder-storm is near the middle of a room, away from the walls; also remote from any open windows or doors. Outside, the most dangerous place is under a tree. The exposure of the top of a tree, like that of a lightning-rod, makes it liable to be struck; and the conductivity of a tree is not, like that of a metallic rod, sufficient to carry the discharge without some of it escaping on the way down to the ground. There are many instances of persons being struck who have taken refuge under trees from the violence of storms.

When any one is struck by lightning but not killed, he lies paralyzed for a time. He should be put to bed, with hot bricks or bottles to his feet, arms, and body. Ammonia may be held, for a few moments at a time, to his nostrils. If breathing has ceased, yet there is thought to be a hope of life, artificial respiration may be resorted to, as described under **Drowning.** A piece of iron, as a poker, may be heated, just short of the burning-point, and held for a moment, several times in succession, against the skin at the pit of the stomach. If these means do not produce reaction and restoration, the shock will prove fatal.

When a person struck does get over it, he is almost sure to be weak for a time; and will require rest of body and mind long enough to regain his usual condition of health.

Muscles, Strained. A muscle or its tendon may be ruptured or torn across by violence. Under sudden and extreme exertion, a tendon may be entirely sundered, though this is very rare. The nearest approach to it ever coming under my knowledge has been the tearing in two of the *patella* (knee-pan), the *bone* at the knee in the course of the tendon of the great muscles of the thigh, by an effort to avoid falling backwards. When a muscle is simply *strained*, some of its fibres are no doubt partially divided. It then gives pain to use the muscle; it is sore also to the touch, and may perhaps become more or less swollen and inflamed. The treatment needed is, chiefly, to give the muscle perfect *rest* until it recovers, by the healing or knitting together of the divided fibres or *fibrillæ*. The time required for this varies very much. A strained muscle may be weeks, months, even sometimes a year or more in recovering all its previous strength. *Bathing* with a stimulating liniment, as soap-liniment, will promote the nutritive action necessary for such repair. Perhaps a bandage may be required, for a time, to secure the part at perfect rest.

Nail, Splinter under. To get out a splinter which is beneath the nail, *pare* the nail carefully, over the splinter, making a narrow groove, until its upper end is exposed. Then, with a pair of small nippers or tweezers, or less easily with a thumb and finger, one may seize and draw it out. When a nail is injured or destroyed, it grows from above, that is in the direction of the length of the finger or toe, downwards or forwards. This can easily be observed on watching the change of position of marks made and left by the injury, as the nail is gradually restored.

Needle penetration. A needle gives almost no pain in entering the flesh anywhere; and it may slip about and be pushed by the muscles in various directions, so as to come near or through the surface far from where it entered. An old lady, a patient of mine, had a needle, which got into her hand, to travel as far as her side, below her waist, where it made its appearance and was taken out. If a needle should happen, in such wanderings, to reach the heart, it would no doubt so affect its movements as to cause death; but that is extremely unlikely to happen. Still, nobody wishes to have even so small and smooth a thing slipping about in his body. If a needle, or part of a broken one, is known to enter the skin, a doctor had better be asked to try to get at it, if it has not already passed beyond being reached by a small incision. A careful unprofessional person, with a sharp penknife and a pair of small forceps or tweezers, may safely make such an effort, but it will not be worth while to cut very deeply for it. The same may be said of bits of broken glass. If not seen and removed when first getting in, they may remain a long time without much irritation or disturbance. I once removed from the sole of the foot of a servant-girl a piece of glass more than two inches long, part of a larger piece on which she had trodden two years before. The lameness caused by it, slight at first, had finally increased under some accidental change in the position of the fragment.

Nose, Foreign Bodies in. Children now and then push peas, small marbles, etc., into their own or one another's noses. If the intruding thing be not very large, blowing the nose very hard, while the other nostril is closed by pressure, may force it out. If not, a piece of wire (a hairpin will do) may be bent so as to form a small round loop at its end, and this (first being oiled) may be gently pushed up around and behind the offending object, to draw it down. Should this not succeed, the aid of a surgeon must be obtained, who will use slender-bladed but strong forceps, made for such emergencies.

Shock. Several times already we have had occasion to speak of this; as, for instance, in connection with **lightning-stroke.** A shock to the whole system may be produced by a heavy fall; by a blow on the head, chest, stomach, or back; or a severe burn; a gunshot wound of any part of the body (unless only the hand); a railroad or machinery injury, crushing or tearing a limb or limbs; or a severe fright or other agitation of mind. The condition resulting is that of prostration or collapse, with paleness, coldness, a ghastly appearance of the face, feeble, flickering, or scarcely perceptible pulse, thirst, and loss of voice; breathing sometimes gasping. It is a close approach to death. The "indications" for treatment of shock are, for *rest, warmth*, and careful stimulation or support. In the way of rest, avoid carrying the person injured to any great distance. The nearest suitable home or hospital, or even temporary place of repose, should be chosen. Then let him be placed on a comfortable bed, well covered, and with direct heat to his body and limbs, by means of hot bricks, bottles of hot water, or tins of the same, bags of hot salt, etc., whatever can be quickly prepared. For stimulation, *ammonia* is quick and good; half-teaspoonful doses of aromatic spirit of ammonia, each in a small wineglassful of cold water, every fifteen or twenty minutes, for three or four times. Also, I have confidence in the value of careful alcoholic stimulation in cases of simple shock; but there is no advantage, and often afterwards much disadvantage, to be expected from the enormous doses of whisky or brandy sometimes given. A dessertspoonful (two teaspoonfuls) in a wineglassful of water will be enough at a time; repeated, if need be, in a quarter of an hour at first, and with lengthening intervals afterwards, until reaction comes on. After the first two or three doses it will be better to give the whisky or brandy in twice as much *milk*, instead of water. As soon as reaction decidedly sets in, stop the ammonia and whisky. Give, then, at hour-long intervals, strong soup or beef-tea, with some Cayenne pepper in it for the stomach's sake. If over-stimulation be practised during the time of shock after an injury, fever will be apt to follow, and the crushed limb, gunshot wound, or whatever may be the hurt, will be liable to inflammation or other troublesome consequences.

Spine, fracture or concussion of. If at the neck, death is commonly immediate. When near the middle of the back, life may continue awhile, with loss of feeling and power in the lower half of the body; including the bladder and bowels. Severe injury of the lower part of the spine may cause only paralysis of the legs and feet; with which the patient may live for months, perhaps years, bedridden and helpless.

Suffocation with foul gases. The most common danger of this kind is from *carbonic acid* gas, which is produced when charcoal is

burned, and is the chief, but not the only, result of the burning of wood, coal, coal-oil, illuminating gas, etc. *Carbonic oxide* also is formed in the burning of coal or gas, especially when the supply of air is not great. Both of these gases are poisonous; the latter the most so. Ten per cent. of carbonic acid gas in the air will make it fatal to any one who continues many minutes in it; and a less amount will cause a person to fall insensible in a short time. *Pure* carbonic acid gas causes a spasmodic closure of the windpipe against it, so that it is really irrespirable.

Sometimes a person, from ignorance or want of thought, will go to sleep where charcoal is burning, with too little chimney-draught to carry off the gas. He will either die, or will narrowly escape death, as was the case with a patient of my own some years ago, and as happened to a fellow-student while I was attending medical lectures at the University. Or, again, a coal-stove may leak out gas from some defect. This gas is a mixture of carbonic acid with other gases; but the effect is of the same kind. The unpleasant smell should warn any one of this danger; but that is not always regarded. A bad smell also shows when illuminating gas is leaking into a room; yet many instances have occurred of persons blowing out the gas in their rooms and then going to bed—never to rise again. Still another danger from carbonic acid is met with in descending into *old empty wells*, or into *beer-vats;* in the one case the gas coming from the earth, and in the other fermentation generating it. It is a heavy gas, and takes time and exposure to diffuse it through the atmosphere. Natural gas, used in many places, is almost without smell.

What is to be done for any one overcome in either of these ways? First, *get the patient into fresh, pure air.* Then dash or sprinkle cold water into his face. If he does not breathe at all, at once begin artificial respiration. (See **Drowning.**) Also, let some one rub his legs briskly upwards, to favor the movement of blood in the veins towards the heart. Warm bricks or bottles should be put to his feet. In the case of my fellow-student (afterwards Dr. W. M. Morgan, of Pittsburg) oxygen was brought from the laboratory of the University, and supplied for him to breathe; but this can seldom be got.

It is often a pressing question how to *rescue* any one overcome in a beer-vat, or in a well full of stagnant and poisonous air. One man after another may go down (as has repeatedly happened) and fall senseless like the first victim. Dashing water pretty freely into the well or vat will hasten the absorption and diffusion of the gas. So will letting down an umbrella and drawing it up again as fast as possible. One who goes into such a place should bind a *wet folded handkerchief* over his mouth and nostrils; and this is also a useful precaution for firemen

in rushing into a burning building. There is no doubt that many people in houses on fire are suffocated by gas and smoke before the flames reach them. Another important caution is, when illuminating gas has escaped into an apartment, not to take a lighted candle or lamp, or even a lighted match, into it, as an explosion will be likely to follow. Some one should, instead, grope rapidly for the windows in the dark, and throw them open; and then get the suffocated person out as soon as possible.

Swallowing *indigestible things* gives alarm in many cases where there is little danger of real injury. *Pins* are apt to be swallowed when held in the mouth, which is a very imprudent thing to do; but they will more often stick across the upper part of the throat than go down. (See **Choking**.) When a pin is actually swallowed, there is reason to believe that it is almost sure to find its way at last through the bowels and out with the discharges. If a *horn* button, or a piece of india-rubber, or a marble, is swallowed, it will be pretty sure to take the same course in time. None of those things are poisonous. A metal button, however, as one of brass, or a copper coin, as a penny, is much worse. Such a thing may pass safely through; but if it stays in the stomach or bowels, gradually corroding, it will poison the system, perhaps fatally. A brother of mine, while a child, lost his life in that way, two years after swallowing a brass button. From such a result, no medical skill can provide escape; unless, when such a thing is known at the time to have been swallowed, prompt dosing with an *emetic* will bring it up with vomiting. A teaspoonful of powder of Ipecacuanha, or a teaspoonful of Syrup of Ipecac., repeated in ten minutes if necessary, and followed by a large drink of warm (not hot) water, will answer for this purpose. If no Ipecac. is at hand, a tablespoonful of salt, or a teaspoonful of mustard, in a teacupful of warm water, will do.

It is not worth while to give an emetic on account of the swallowing of *non-poisonous* indigestible solids. Nor is it best to give, on their account, an immediate dose of purgative medicine. Let the person eat rather heartily of *soft food*, as mush, pudding, tapioca, etc.; and the next day, if the bowels are not free, he may take a moderate dose of castor-oil. While, however, such things, in a majority of cases, do no considerable harm, exceptions to this do occur. Even an apple-seed or core has been known to lodge in the *appendiculum vermiforme*, a small tubular appendage to the large intestine, and, by inducing ulceration, to cause death. I have known swallowing cherry-stones in large numbers (as is often done by boys when up a tree after cherries) to be followed by severe pain and irritation of the bowels almost like dysentery. On the whole, it is well to use our senses of touch, taste, and sight carefully,

knowing what is in the mouth always before we swallow it. Among other things, when eating canned vegetables, fruit, etc., take care not to swallow bits of soldering metal, such as now and then become loosened in the can. As these contain lead, they may produce lead poisoning. This has been known to happen.

Tendon, rupture of. This is a rare accident, but is known to have sometimes occurred, especially at the junction of the muscles of the calf of the leg with the "Achilles" tendon, which goes down to the heel. John Hunter, the famous English surgeon, met with this injury in dancing, at the age of forty years. *Treatment* of it requires rest in bed for two or three weeks; the foot being extended, so as to keep the heel well raised towards the calf of the leg, and bandaged firmly in that position.

Transportation of injured persons. See the last part of the article on **Wounds.**

Ulcers. An ulcer occurs only as a possible *secondary* result of an injury; as a large wound, burn or scald. For the *treatment* of such a result, see **Ulcer,** in **Part IV., Special Diseases.**

Veins, injuries of. See **Wounds** (pages 875, 876).

Wounds. These may be either *Bruised, Crushed, Cut, Lacerated* (Torn), *Penetrating*, or *Poisoned* wounds.

Bruises are familiar to everybody. If the blow or fall has been of such moderate violence as to injure only the surface of the head, body, or limbs, it is not a serious matter. Some blood will be forced out of the small vessels; swelling and discoloration will follow. It will be first red, then almost black and blue, and at last dull yellow or yellowish-brown. This is the history of a "black eye," or of a bruise of any other part. Early use of a soothing application will do the most good. There is nothing better for this than cacao (cocoa) butter, or "camphor ice." Arnica has a reputation for bruises far beyond its desert. In the family, however, for every hurt "something must be done" to ease the minds of those around. Arnica will answer this purpose at least. When a bruised part becomes painful, a cloth wet with lead-water and laudanum will be suitable. Later, bathing with soap-liniment will hasten the absorption and disappearance of the blood-deposit which causes the discoloration.

Crushed wounds are much more serious, often endangering life. Such, affecting the head, will cause fracture of the skull (see **Head, Injuries** of). Falling on the chest, ribs may be broken; or, worse, the heart or lungs may be so pressed as to kill at once or shortly. When a limb is crushed in a railroad accident, it may be wholly or partly severed from the body. We might expect great bleeding in such cases; but it does not occur; the arteries are paralyzed, and bleed little or none, even when torn across. The immediate danger then is from *shock*, going down into fatal *collapse*. (See **Shock.**) When this is recovered from, the injured limb must be dealt with according to the methods of surgery. Amputation is often called for; the damage being too great for the limb to be possibly saved.

Shock constitutes the greatest immediate danger in all crushing injuries. Afterwards, there may be inflammation (or perhaps mortification) of internal organs involved; lungs, liver, stomach, kidneys, peritoneum, etc. Such cases will require perfect rest in bed, with treatment which can only be judged of by an experienced practitioner of medicine or surgery. *Tetanus* (lockjaw) occasionally follows a crushing injury.

Cut wounds are dangerous at first through *bleeding*. Bruised, crushed, and torn wounds bleed, as a rule, very little. Much difference exists as to *what* is cut in an incised wound. If only small vessels, the capillaries, are divided, the blood flows steadily, of a moderately red color, being a mixture of arterial and venous blood. If a *vein* is cut, the flow is steady, and the color of the blood is *dark*-red, almost blue-black or dark-purple. When an *artery* has been cut, *bright* red blood comes out

in *jets*, timing with the pulsations of the heart. (See **Physiology; Circulation.**)

Whatever the source of a flow of blood from a cut wound, we should endeavor (after cleaning out, best with a stream of cold water, any *foreign bodies* in it) to stop the hemorrhage by putting and holding the edges of the wound together. *Pressure* may then be added, so far as needful and available. Over a solid *bone*, as the skull, this will always be practicable. Bleeding even from a divided artery of the scalp can always be checked, by firm pressure on the vessel against the bone. A *compress* may be made by folding up a fragment of handkerchief, or rag of muslin or linen, into a thick piece an inch square. Laying this right over the source of the bleeding, it may be kept in place by the firm application of a bandage around the head.

Elsewhere in the body the difficulty of stopping bleeding may be greater. Worst of all, of *incised* (cut) wounds at least, not penetrating the chest or abdomen, is the cut *throat*. For suicidal or murderous purposes, this is not rare. Many suicides divide only the *windpipe*, or the windpipe (*larynx* or *trachea*) and gullet (*pharynx*) together. They die a lingering death after several days. Others make a bolder cut, and sever also the *jugular vein;* commonly on one side only. This will bleed fearfully, enough to cause death in a very short time. If promptly seized between a thumb and finger, and then skilfully stitched with a small surgical needle, it is *possible* that life may be saved; but, with the best surgery, this has seldom been done. Now and then a suicide may reach with the razor one, almost never both, of his *carotid arteries*, which lie closer to the windpipe than the two jugular veins, but are deeper in the throat. Such a wound, unless it be a mere *nick* in the artery, will end life in a few seconds. A very slight incision in the carotid alone may, if at once seized and held firmly, allow of the *tying of the artery* with a ligature, below the wound. This operation not many surgeons have performed; and it does not always succeed in averting death as the final result.

To stop bleeding from a *vein*, large enough to be seen, when pressure *at the wound* will not do it, the rule is to press just *below* the wound; that is, on the side *farthest from the heart;* as the blood flows in the veins *from* the extremities *towards* the heart.

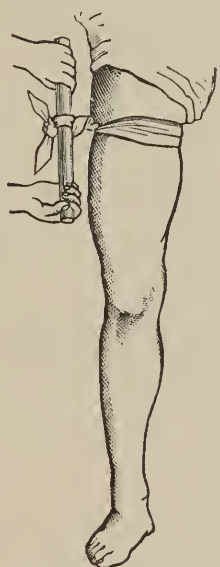
When an *artery* bleeds, and pressure *at* the wound fails or cannot be applied, pressure must be applied *above* the wound; that is, on the side *nearer* to the heart; the course of the blood in the arteries being *from* the heart. In **Physiology** this has been fully explained, and the way to find the main arteries of the body has been set forth. We may just repeat a few practical points.

If a *finger* bleeds from a deep cut very freely, pressure on the *two sides* of the finger will check the arterial flow and control it. If the *hand or forearm* has an arterial hemorrhage, the *brachial artery* (main artery of the arm) must be compressed. This is done by finding its pulsations *behind the biceps muscle, on the inner side of the arm,* and holding it there against the arm-bone (*humerus*). To continue such pressure, a Spanish windlass may be made. Pass a handkerchief around the arm, and tie a knot in it, close to the arm on the inside. Then put under the handkerchief, on the outside, the handle of a hair-brush, or a stick of any kind, and twist it until the pressure suffices to stop the flow of blood. If the arm is held up with the hand raised above the

Fig. 267.

PRESSURE ON ARTERY OF ARM.

Fig. 268.



SPANISH WINDLASS.

Fig. 269.

PRESSURE ON ARTERY OF THIGH.

head, this will be the more easily effected. Such pressure cannot be very long maintained, without danger of mortification of the limb. Should the bleeding return as soon as the "windlass" is partially unwound, surgical aid must be obtained to "take up" the artery; that is, to cut down to it and pass a silken or catgut cord (ligature) around it, and tie this so as to stop all movement of blood through the artery.

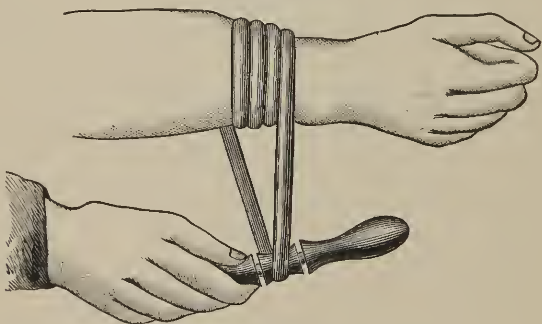
Some hemorrhages from the forearm or hand may be held in check by *forcibly doubling the arm at the elbow,* in this way compressing the artery where it branches, in front of the elbow joint.

If the *foot, leg,* or *thigh* is cut so deeply as to have an arterial hemor-

rhage, the place of pressure (if it cannot be applied sufficiently at the wound) must be at the *upper and inner part of the thigh;* that is if the Spanish windlass be used, the application being just the same in method as upon the arm. But a still surer place of pressure is where the great artery of the limb passes over the bony edge of the pelvis; just half-way between the middle of the pelvis in front and the prominent point of the ridge of bone at the front of the hip-bone (anterior superior spinous process of the ilium; see **Anatomy**). There its pulsations can be felt; and the handle of a large key, wrapped with tape or ribbon to soften its pressure, may be held firmly down upon it so as to keep the flow of blood back altogether.

Suppose then that, having a cut-wound to treat, all bleeding has ceased, and no dirt or fragments of any kind are in the wound; we must now try to prepare it for healing without delay or deformity.

FIG. 270.



PRESSURE BY ELASTIC BAND.

Place the edges together. Will they stay so? Not often without support. On many parts of the body this may be given by *strips of adhesive plaster;** if the wound is large, several narrow strips, with small spaces between them. When the edges are evidently not going to be securely held in that way, *stitches* will be important. Silk or shoemaker's thread (or other thread, if necessary to save time), waxed, will answer; and a large common needle may be used instead of a surgeon's needle, if professional assistance is not within reach. Two sorts of stitches are often employed: the *continuous* and the *interrupted.* The latter is generally to be preferred; each stitch can then be dealt with apart as it requires. For it, pass a threaded needle from within the wound out through the skin; then take off the needle and thread it with the other end, and pass it in the same way out through the other

* Martin's (or Grovenor & Richards') rolls or spools of "Surgeon's adhesive plaster" are the most convenient for such use.

side of the wound. Then the two ends should be brought together and tied. Lips, noses, ears, and some other parts will be apt to have gaping wounds and ugly scars, when cut, unless stitches are used.

We want a wound, then, to heal "by the first intention," as it is called. That is, *directly*, without any pus or matter being formed. All that is necessary for this, with a clean-cut wound in a healthy body, is, that the edges shall be brought and kept close together for a few days, without disturbance. Put over the wound, then, after the plasters or stitches have been applied, a doubled piece of lint or soft *clean* (mark this, *clean*) linen, spread with simple cerate, or clean tallow, and bind this on with a bandage, just tight enough to keep it in its place. The part must then be kept at rest, and need not be disturbed, while it seems comfortable, for four or five days. In that time, a surgeon's advice can usually be obtained. If not, and the wound does *not* seem comfortable, it must be carefully examined, and perhaps dressed over again. After five days, at all events, it may be very carefully uncovered; removing the outer cerate dressing, and seeing whether or not any of the adhesive strips need to be renewed. If this be so, be sure to take them off one by one; drawing the strip *towards*, not away from, the edge of the wound; and replacing each strip by a fresh one, before another is taken off. Very little washing is necessary for healing incised wounds. Clean the parts near with Castile soap and water, but do not interfere with the *plastic process* going on at the wound itself.

Water-dressing is preferred to cerate by many surgeons, even for simple incised wounds; but it appears to me to have greater advantages in the management of *lacerated* and *penetrating* wounds.

Lacerated wounds are those which are *torn;* as by machinery, or bites of dogs, horses, or other beasts, etc. They are irregular in shape, seldom bleed much, but often inflame, sometimes mortify, and hardly ever heal "by the first intention." *Machinery* injuries may be dreadful in character; a whole limb being torn off at once; or a hand or a foot torn to pieces. Such may be speedily fatal by shock; or their results may entail a tedious and uncertain struggle for life; at least when an arm or a leg is badly lacerated. *Erysipelas* is one of the dangers attending such injuries; *tetanus* (lockjaw), another; *septicæmia* (or *pyæmia*), another.

Besides what may be needful on account of the general shock to the system (see **Shock**), lacerated wounds require to be carefully cleared of all fragments of foreign bodies, dirt, etc., and then protected from the air by a proper dressing. To *cleanse* such a wound, a stream of water should be allowed to flow over it from a *clean* sponge, dipped in warm water and squeezed above the wound. *Water-dressing* agrees well

with such injuries. Double a piece of lint or soft linen, and squeeze it out of *clean* tepid water or clear lime-water. Lay this upon the wound, and cover it with a piece of oiled silk, oiled paper, or thin rubber-cloth. Bandage it on the part with just enough firmness to prevent its being displaced. Such a dressing will have to be moistened at least twice a day, and had better be changed once in twenty-four hours; disturbing the wounded surface each time as little as possible. Before the dressing is reapplied, sprinkle iodoform powder lightly over it. This is antiseptic, and promotes healing.

Much is said in late surgical works of *antiseptic dressings* for wounds. The idea of it is, by chemical solutions applied to injured parts, and to the hands of surgeons and nurses, etc., to destroy the "germs" in the air, water, and other materials which are supposed to breed putrefaction, decay, and disease. We have discussed this theory in connection with the **Causation of Disease** (*Germ Theory of Diseases*). Enough here to say that the importance of it is much the greatest in *large hospitals*, or other houses in *cities*, where the *air* is apt to be *foul;* and that the practical results of antiseptic surgery, so called, are equaled, without any special "solutions," when *absolute cleanliness* is maintained, of air, water, and all other materials.

When much irritation or inflammation of lacerated wounds occurs, a poultice, of bread or flaxseed-meal, may be for a time beneficial. When healing is advancing favorably, instead of the wet dressing, lint or linen spread with simple cerate will answer, and is much less troublesome.

Penetrating wounds may vary much; from piercing with a pin to a bayonet, sword, or bullet wound. Even a needle or large pin may be forced into the heart, so as to cause death. One of the first Napoleon's generals so committed suicide. Usually, however, a needle glides almost harmlessly through skin and flesh, and the head of a pin prevents its deep penetration. The seriousness of larger penetrating wounds depends almost entirely upon the *parts reached* by the puncturing instrument or weapon. A bayonet or bullet wound of the *heart* will always kill. One of a *lung* will be most frequently mortal; but the exceptions are many. General Shields, U. S. A., was shot through the chest, many years ago, and recovered. A patient of my own, in hospital, got well after a load of buckshot had gone through a part of his right lung. A penetrating wound of the *stomach* is nearly certain to be mortal; yet Dr. Beaumont, of Ohio, was made famous by his physiological experiments in the case of the Canadian soldier, Alexis St. Martin, who lived for years with a hole in his stomach through which food could be taken out during digestion. Wounds of the *bowels* are only a little less dangerous, especially because *peritonitis* is so likely to supervene; and

the same may be said of injuries of the *liver, spleen, kidneys,* and other organs contained in the abdomen. Penetrating wounds of the *head* have been considered already (see **Head, Injuries of**). When an *arm* or a *leg* receives a knife or bayonet thrust, or a bullet or shot wound, there may be *hemorrhage,* from a large vessel being pierced or divided. Then it needs the same kind of management as a bleeding *cut* or incised wound. If not this, there is little *immediate* danger to life; but inflammation, suppuration, mortification, erysipelas, pyæmia, and septicæmia are all possibilities in such cases.

Every one receiving a severe penetrating wound, of any part of the body, must be kept in a condition of complete rest, awaiting results which need to receive the best professional attention, to meet the dangers, seen and unseen, belonging inevitably to such injuries. Those who were old enough to read the daily bulletins of President Garfield's heroic struggle for life, under care of the best surgeons in America, and the best possible nursing, may well know that a sentence of death may come with the entrance of a missile, which no human skill or power can avert.

Poisoned wounds. These are seldom met with, even in war, amongst civilized nations, except by unintended causation. This may happen especially to physicians and surgeons, in their operations, and to medical students in the dissecting-room. Matter from dead bodies, or from diseased living ones, introduced even into the slightest scratch with a knife, needle, or pin, may so taint the blood as to produce a dangerous illness. Not a few physicians have suffered a fatal result from pricking a finger in a post-mortem examination. To *prevent* such results (besides care to avoid letting an abraded or punctured part come in contact with morbid matters), as soon as such a thing has happened, the part should be immediately *washed* and *sucked,* and then kept out of the way of further danger.

In the *treatment* of poisoned wounds, there is nothing different from that of those which are *penetrating* or *lacerated,* unless the wound is made by *rabid animals* or by *venomous serpents.* For either of these last, *immediate suction* is a right precaution; and at the same time a tight cord around the arm or leg, if either extremity has been bitten; then the end of an iron wire or rod, *heated red hot,* or a piece of *caustic potassa,* should be made to burn out the part; or a pinch of gunpowder may be exploded upon it. All these severe measures are designed to prevent the poison from getting, through the blood-vessels, into the system. Although not more, probably, than one in ten of those bitten by mad dogs have hydrophobia, that one will incurably suffer a dreadful death. Therefore it is worth while to do and suffer much to prevent

such a possible catastrophe. (See **Hydrophobia**, under **Special Diseases.**)

Bites of rattlesnakes, copperheads, and moccasin serpents in this country, and similar reptiles in the countries of the old world, are often fatal. In India, thousands die annually of the bites of the *cobra* and other venomous snakes. The danger is greatest according to the amount of the poison introduced, and the part of the body bitten. After a rattlesnake has already bitten anything several times, his poison-bag is empty, and his fangs are almost innocent of venom for a time. Biting through a boot, or thick clothing, detains much of the venom, lessening the danger. But if an unexhausted serpent of that species, or a moccasin, or a copperhead, bites the bare *face* or *neck*, or *hand* or *arm*, death will be likely to take place within an hour or two. If other parts of the body be bitten, it may still be fatal, but there are chances of recovery. Is there any reliable antidote?

You will read accounts of such in many books and newspapers. But Dr. S. Weir Mitchell, after a most elaborate series of experiments, concluded that, at the time of his researches, no true antidote to rattlesnake poisoning had been found. Since then, two such (for other serpent bites) have been asserted; *ammonia* in Australia, and *permanganate of potassium* in South America. Both are injected in solution, either into the poisoned wound or into the skin (hypodermic injection) elsewhere. Observers in other countries have been disappointed with Dr. Fayrer's ammonia antidote. Dr. Lacerda's permanganate treatment has not yet had sufficiently extended trial for a final conclusion; but, were I bitten, I should wish to try the latter. It can be confided in only when introduced immediately *at the place* of the poisoned wound.

Popular rather than scientific has been the *whisky* treatment of rattlesnake poisoning. Yet science cannot object to it, since one poison is often an antidote to another. The practice referred to is, to dose the victim with whisky pretty largely, with quantities which would intoxicate if the state of the system did not prevent or at least retard it. There is reason to believe that patients do sometimes recover under this treatment who otherwise would probably have died.

Another (now quite unpopular) remedy is suggested by some facts observed in experiments upon animals. In those bitten by venomous serpents, it has been found repeatedly that *drawing blood from their veins* has been followed by immediate improvement, and sometimes by recovery. As a method of getting rid of *tainted blood*, this appears to me a most reasonable procedure. Not anticipating its general acceptance under the now prevailing opposition to this remedy under almost all circumstances, I must be content with commending its consideration and fair trial to the coming generation.

Stings of bees, wasps, yellow jackets, and hornets, as well as of some spiders, and, in other countries than this, the tarantula and scorpion, are often decidedly painful; in a few persons, they may even endanger life. When, for instance, upon disturbing a hive, a whole swarm of bees fly out and light all over a man's head, face, neck, and hands, the amount of venom introduced by even such small "beasties'" stings is not trifling. Horses have sometimes been thus stung to death.

The old simple country remedy I have found effectual—smearing the place at once with *mud*, from the nearest spot where earth and water can be mixed together. *Ammonia* (spirits of hartshorn) is nicer, and probably more certain to be effectual, applied at once to the stung part. If a person seems to be affected "all over" by even a single sting of a bee (which sometimes happens), half a teaspoonful of *aromatic spirit of ammonia*, in a wineglassful of water, may be taken as a draught, at once; and, as soon as it can be obtained, twenty grains of *bromide of potassium*, in the same quantity of water. The latter dose may be repeated in two or three hours, if required.

Hot water is recommended by some, to be applied at once to the part, as a remedy for the sting of a bee, wasp, etc. I have not tried it, but suppose it may be efficacious, if *very* hot, by destroying the poison. A moistened cigar, or plug of tobacco, is said to give prompt relief to the pain. An *onion* is also advised, in some popular works, as a local remedy, even for the bite of a venomous serpent. I can give no opinion as to its value.

Transportation of Injured Persons. On this subject we cannot do better than follow Esmarch, the distinguished German surgeon.*

"When an accident occurs, be it in the country, on the high road, or in a town, the first thing to be done is to transport the injured person as quickly and as carefully as possible to a doctor or to a hospital." "In such circumstances, stretchers or litters should, if possible, be used. These are simply light portable beds made of a framework of poles, with a piece of canvas stretched between them."

"To place an injured person on a stretcher and convey him properly requires a certain amount of handiness—which, however, is easily acquired by a little practice. Only three bearers are required, unless the distance be very great; two of them carry the stretcher, and the third attends to the patient, and changes place with one of the bearers if necessary.

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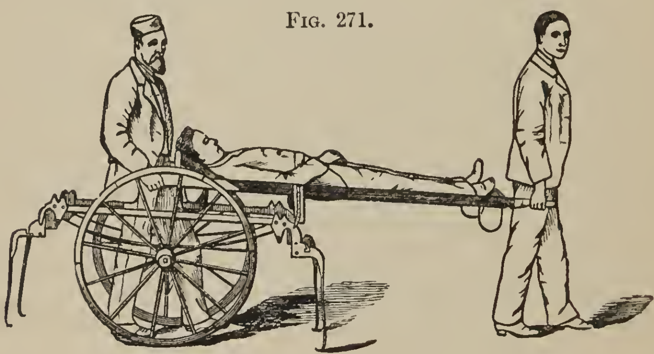
* "Early Aid in Injuries and Accidents." Translated by H. R. H. Princess Christian. Philada., Lea Brothers & Co., 1884.

"To place the patient on it, put the foot of the stretcher at his head in a line with his body. If you put it at the side of the patient, it is in the way of the bearers, and they may stumble or fall over it. The two bearers then place themselves one at either side, join hands underneath the back and hips of the patient, raise him up, lift him backwards over the stretcher, and lower him on to it. The third bearer takes charge of the injured portion (limb or head), and steadies it with a hand on either side. The two bearers now take their places at the head and foot of the stretcher, lift it up, and carry it off; while the third walks at the side of it, as a safeguard to the patient.

"The following rules should be observed in carrying a stretcher:

"1. It should be carried with the hands, or suspended by straps over the bearers' shoulders.

FIG. 271.



WHEELED LITTER.

"2. The bearers should not keep step. If they keep pace, as in marching, the stretcher sways from side to side, and the patient is apt to roll.

"3. All jolting, hurried movements, the crossing of fences, ditches, etc., are to be avoided. Look out for gaps, gates, and doors, and make use of them.

"4. If possible, choose bearers of the same height. If this cannot be done, arrange the shoulder-straps in such a way that the stretcher may be balanced as evenly as possible.

"5. In ascending, the patient's head must be in front; in descending, behind; except in the case of a broken leg, when, if such a course were adopted, the weight of the body would press on the injured part.

"6. The patient must be removed from the stretcher in the same manner in which he was placed on it.

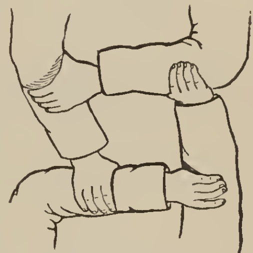
"Should no stretcher be at hand, one must be improvised—*i. e.*, you must look about for a substitute, or put together a variety of things on which the injured person can be transported without further harm.

Amongst the articles to be found in inhabited houses which can be used for such, are—bedsteads, bedframes, sofas, window-shutters, boards, benches, chairs, etc. Such hard materials should be covered by pillows, blankets, straw, etc.; mattresses, or sacks of straw, having rings or loops made with straps attached to their four corners, may also be used as stretchers. Counterpanes, blankets, rugs of all kinds, may be carried by the four corners by four men; or may have two poles sewn to their sides, and be carried by two men. Empty corn or flour sacks may be used for the same purpose. From woods and gardens you can take branches and young spruce stems, and, binding them together with birch twigs, make excellent temporary stretchers with supports."

"If neither a stretcher nor material out of which to make one can be found, then try to transport the wounded man with your arms, which naturally can only be done for a short distance."

"The wounded man must place his arms around the neck of the man carrying him." "Should there be two people at hand to render assistance, the wounded man may be transported in a variety of ways, viz.: 1. Sitting on the hands of the bearers, who pass two hands under the thighs and two behind the loins, the patient putting his arms round the necks of those carrying him. 2. The persons transporting a wounded man join their hands firmly together, forming a sort of sedan chair, on which they can carry him a long distance if he places his arms around their necks."

FIG. 272.



A MODE OF CARRYING AN INJURED PERSON.

We may add that a *chair*, especially an arm-chair or rocking-chair, in which the patient is seated, will answer well to carry an injured person. If he be faint, or if a lower extremity be hurt, the chair may be tilted backwards as far as his comfort may require. When two bearers carry a patient in any way *without* a litter or stretcher, they should keep step; as the motion is then more even, and there is no danger of his rolling out of their arms or out of a chair supported between them.

When any one is so injured as to be in a state of *collapse*, approaching death, as from drowning, suffocation, or hemorrhage (bleeding), it is necessary to attend first to his prostrate condition *on the spot;* before taking him to a hospital, or anywhere else. (See Drowning.)

When there is severe bleeding, its source must be found, so that it may be stopped (see page 876). For such inspection, do not wait to *take off* the clothing near the injured part; but *cut or rip* all that is necessary for the purpose.

Fig. 273.

Fig. 274.

MODES OF CARRYING INJURED PERSONS.

Fig. 275.

ROCKING-CHAIR FOR CARRYING A PATIENT.

PART VI.

POISONING.

POISONS are of several kinds: **animal**, as snake-venoms and cantharides; **vegetable**, as opium, strychnia, tobacco; **mineral**, as arsenic and corrosive sublimate. But a more useful classification of them is according to their effects: as **Depressants**, **Irritants**, **Neurotics**, and **Complex** Poisons.

Depressants are *Prussic* (Hydrocyanic) *Acid*, *Tobacco*, *Lobelia*, *Hemlock*, and *Aconite*. It is true, the effects of these, and indeed of almost all poisons, have some complexity; but their *chief* effect is depression, sinking, prostration; which, from a certain dose, is fatal.

Irritants are strong *Acids*, as *Sulphuric*, *Nitric*, *Hydrochloric*, *Oxalic*, *Citric*, and *Tartaric* Acids; strong *Alkalies*, as *Potassa*, *Soda*, and *Ammonia; Phosphorus; Corrosive Sublimate; Tartar Emetic; Salts of Copper* and of *Zinc; Castor-Oil Seeds; Colchicum; Croton-Oil; Cantharides;* and certain *Fishes* and *Molluscs* (some *Mussels*, etc.).

Neurotic Poisons either produce *stupor*, as do *Opium*, *Chloroform*, *Ether*, *Chloral*, *Hyoscyamus*, and *Camphor* (in excessive doses); or *otherwise* damage the nervous system, with either *delirium*, *convulsions*, *tremor*, or *paralysis*, as *Strychnia* (or Nux Vomica), *Belladonna*, *Stramonium*, *Calabar Bean*, *Cocculus Indicus*.

Complex (*Irritant-Neurotic*) Poisons are such as *Arsenic*, *Carbolic Acid*, *Creasote*, *Digitalis*, *Ergot*, *Fungi* (*Toadstools, etc.*), *Hellebore*, *Iodine*, *Bromine*, *Lead*, etc.

As already said, *Depressant* Poisons cause prostration, sinking: with paleness, coldness, feeble pulse, gasping breath, with or without nausea and vomiting; all the symptoms of *collapse*.

Irritant Poisons produce burning and pain in the mouth, throat, stomach, and bowels; with nausea, vomiting, and purging; an *artificial cholera-morbus*.

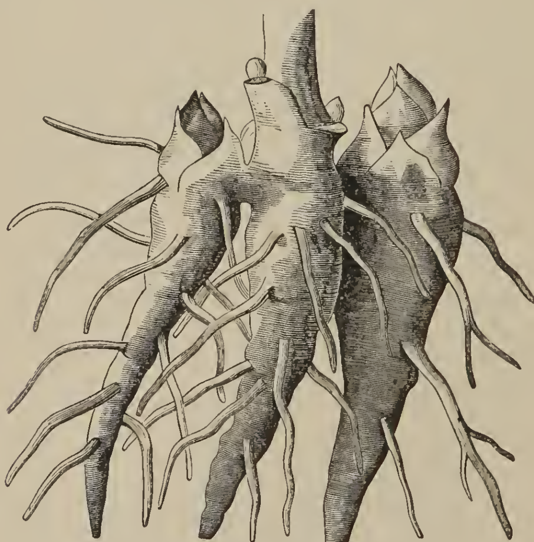
Neurotic Poisons have just been described as causing either stupor, delirium, convulsions, tremor, or paralysis. **Complex** Poisons may combine several of either of these kinds of effects.

So far, we have been considering Poisons as taken into the *stomach* by the mouth. It must be remembered, however, that they may also enter the system by being *breathed* into the lungs; *injected* under the skin; or even *absorbed* from the surface of the skin (especially with children; a tobacco leaf has been so fatally used); or *inserted* into the bowels, etc.

With these general remarks, we may now take up those poisons most likely to be met with, or heard or read about, *alphabetically*, for ease of reference by the reader.

Acids. As already said, strong Acids are generally *irritant* poisons. Hydrocyanic or Prussic Acid is a powerful *depressant*. Each of these

FIG. 276.



ACONITE ROOT.

will be considered in its place. Just now it may be remarked that the *antidotes* for Acids are *Alkalies* and Alkaline Earths; as Soda, Lime-water, Chalk, Magnesia, and Soap, etc. In like manner, *Acids* of the milder sort, as Vinegar, Lemon-juice, etc., are *antidotes* for poisonous doses of strong *Alkalies* or Alkaline Earths, as caustic Potassa, Soda, Ammonia, or Lime.

Aconite. All parts of this plant (Monkshood, *Aconitum napellus*) are poisonous. The only form in which any one is likely to take it injuriously is that of the *Tincture* of Aconite Root, in overdose (the

proper dose is one, two, or three drops), or by mistake for something else. Death has been caused in this way: two bottles are standing by a patient's bedside, one containing a medicine to be taken internally, and the other a liniment for external application; an attendant, by mistake, rubs a painful part with the medicine, and gives him a tablespoonful dose of the aconite liniment.

Symptoms: burning, *tingling*, and *numbness* of mouth, throat, and stomach, extending afterwards through the whole body; sickness of stomach, dizziness, prostration, sometimes convulsions; no delirium, no stupor, unless in quite exceptional cases. Death, from a sufficient quantity, results in a few hours. Less than a half a teaspoonful of the Tincture has proved fatal in some instances; a teaspoonful will always be likely to do so, if left long in the stomach.

Fig. 277.

ACONITE LEAVES AND FLOWERS.

Treatment. There is no chemical *antidote* for Aconite. *Vomiting* should be produced at once to get rid of it. In the household, do not wait to send to a druggist, but give immediately a teaspoonful of *mustard*, mixed in a teacupful of warm (not hot) water. Repeat this in ten minutes, with large draughts of warm water, if vomiting does not

follow. If no mustard is at hand, a *tablespoonful of salt*, in a teacupful of *warm*, not hot, water, will answer the same purpose. Then mix *powdered charcoal*, a teaspoonful at a time, in water, and let it be drunk; and also *very strong tea*, freely taken. Let the limbs be briskly rubbed with warm hands, and place hot bottles or bricks alongside of the body and to the feet. If other treatment is used, it should be only at the judgment of a physician, who should be summoned as soon as possible. This remark will apply to *all* cases of poisoning; and need not therefore be hereafter repeated.

Alcohol. Hardly ever by accident, but sometimes through folly, men have taken at one time enough whisky or brandy, etc., to kill. The *quantity* necessary for this varies, especially with the *habits* of the person so doing. An old toper may swallow a half-gallon of whisky in a day, with no extraordinary effect. A man unaccustomed to liquor might be killed by a pint; possibly even by less. In such a case, the *symptoms* are those of narcotic poisoning; with but little primary excitement, he falls soon into a deep stupor. The face becomes ghastly, the lips livid, the pupils of the eyes large, the eyes reddened; the breathing is snoring, and an alcoholic odor loads the breath; death may take place within an hour or two. Short of such an event, there are degrees of "dead drunkenness," in which the same symptoms appear, but the stupor is less complete; on being shaken and spoken to, the man will open his eyes partially and show some consciousness. He will then relapse into stupidity, until, after several hours, he sleeps it off.

Treatment of dead drunkenness, when there is not an actual mortal effect, does not gain by any violence. If the patient can swallow, an emetic dose of mustard (a teaspoonful) or salt (a tablespoonful) or ipecac. (a teaspoonful) in warm water, may be given. Wetting the head and face repeatedly with cold water will promote revival; and so may aromatic spirit of ammonia; half a teaspoonful, taken in cold water, and repeated in an hour or two.

Alkalies. See **Acids.**

Aloes. This is an active purgative medicine, whose effects in overdose are those of an irritant poison. The same account may be also given of *Elaterium* (much *more powerful*), *Colocynth*, *Gamboge*, *Jalap*, and *Scammony*. Any of these in excessive dose will bring on painful griping, vomiting, and purging, with consequent exhaustion. *Treatment* of such a condition must consist in perfect rest (a bed-pan being used), and often-repeated small doses of *laudanum* or *paregoric*. An injection of laudanum (forty drops) in starch into the bowels will be well. Lime-water and milk, equal parts, may be administered by the tablespoonful to support strength; adding teaspoonful doses of whisky

or brandy, a few times, if prostration be great. Warm bricks or bottles of hot water, etc., also, applied to the body and feet, will do good.

Ammonia. This is the *volatile alkali.* It has the same chemical relations as the fixed alkalies, potassa, soda, and lithia; but flies off into the air when exposed, requiring, unless dissolved, extreme cold or very great pressure to condense it. It is intensely *pungent* to the taste and to the breathing organs, and acts as an *irritant poison* when taken in large quantities. Two or three teaspoonfuls, at least, of the stronger Solution of Ammonia will be necessary to endanger a fatal result. Aromatic Spirit of Ammonia might have such an effect, if a tablespoonful or two were swallowed at once. *Symptoms* of such poisoning are, extreme burning and pain in the stomach, with nausea and vomiting, followed by *collapse* (deathly prostration), which may end fatally in a few hours. One case has been reported in which this took place in a few minutes; another, after three days. Its being breathed freely hastens the effect.

Treatment of poisoning with Ammonia is like that for other Alkalies. Give *Vinegar* and water, or *Lemon-juice,* quickly and largely. Afterwards, Olive Oil; then Milk; or, if no sweet-oil is at hand, Milk alone. The Vinegar or Lemon-juice combines with and *neutralizes* the alkaline Ammonia. Oil makes a *soap* with it, which is innocent. Milk will then promote the required soothing action, and will also nourish and support the patient.

Antimony. This metal is present in *Tartar Emetic;* which is an ingredient of *Antimonial Wine* and of *Coxe's Hive Syrup.* The last of these was formerly (but ought never to be) a common domestic medicine for croup. Syrup of ipecac. has now very properly taken its place. All preparations of Antimony are powerfully emetic, unless in extremely small dose. They are particularly severe in their action upon *young children.*

Symptoms of poisoning by Tartar Emetic are: a metallic ("coppery") taste, violent nausea, retching, and vomiting (the author suffered with it once, by accident, and found it worse than sea-sickness), thirst, pain in the stomach and bowels, and watery purging; then great prostration, with coldness and clammy perspiration. When only a single overdose has been taken, death may be escaped by all the poison being vomited up. If repeated soon, the danger is increased. The *quantity* necessary to kill varies much, chiefly for the above reason. Less than a grain of Tartar Emetic has killed a child; four grains have proved fatal to an adult; but, more often, twenty or more grains would be required for such an effect. Mostly, death does not take place for several days after the poison has been swallowed.

In *treatment* of poisoning by Tartar Emetic, *Tannin* (Tannic Acid) is

considered to have some antidotal power. If infusion or tincture of *Galls* can be soon obtained, let it be given, pretty freely. In the absence of this, *very strong Tea* may be given. At the same time administer moderate but often-repeated doses of some *opiate;* laudanum or Paregoric. In my own case, above alluded to, teaspoonful doses of Paregoric gave relief in a few hours; the quantity taken, however, (through mistake of a druggist's boy) having been not very large.

Arsenic. Both by accident and through suicidal or murderous intent, this is one of the most frequently fatal poisons. It is used in the manufacture of enamel, and of some kinds of glass, and in ship-building and boiler-making; as well as by farmers to kill potato bugs (Paris green), and in houses and barns to destroy rats. A medicine containing it, often valuable in its place, is Fowler's Solution of Arsenite of Potassium. Arsenic is present also in *orpiment* and in *Scheele's green* (arsenite of copper), as well as in Paris green (aceto-arsenite of copper). *White Arsenic* of the shops is *Arsenious Acid. Metallic* Arsenic is very seldom used, unless with Arsenious Acid in *fly-powder.*

Symptoms of arsenical poisoning are complex. It is an *irritant-neurotic* in its action. About an hour after taking it, there are symptoms of faintness, heat of throat, thirst, and burning pain in the stomach. Violent retching and vomiting follow, and the pain extends through the bowels, with straining and severe purging; sometimes with bloody passages. Prostration soon results; with coldness, small, frequent pulse, and great feeling of weakness; not infrequently delirium, convulsions, or even stupor, will precede death. In slower cases, headache, trembling and other distressing nervous symptoms are common. There is, however, considerable variety in the symptoms of poisoning by Arsenic. Death results in most cases within twenty-four hours; exceptionally, but rarely, in an hour or less; occasionally, after weeks, or even months of protracted suffering.

Treatment. If vomiting has not been already copious, give a teaspoonful of mustard or a tablespoonful of salt in a teacupful of warm water; and follow this with large draughts of warm water, in which *Magnesia* has been stirred and mixed. Magnesia is at least a partial antidote for preparations of Arsenic. The most effectual antidote is *Hydrated Peroxide* (sesquioxide) *of Iron;* in large doses, in the moist state, and freshly made. This may be prepared by putting *Tincture of Chloride of Iron* in water (quantity not of very great consequence, use plenty of it), and then adding *Aqua Ammoniæ* (solution of Ammonia or hartshorn). A thick powder will be thus precipitated;—which, after washing it with clean water, may be given in tablespoonful doses as an antidote for Arsenic. After this has been freely given, or, in its absence, Magnesia,

then an *opiate*, as Paregoric or Laudanum, may be administered in moderate doses, to mitigate suffering; and milk, at first hot (unless preferred cold on account of thirst) will be for a time the most beneficial food.

It may be here remarked, that a practical question of some importance is, whether there is danger of arsenical poisoning from the use of Paris green to kill potato bugs or other injurious insects on growing plants, in gardens or fields. Good authority exists for the opinion, that no such danger exists, when reasonable care is taken. Growing plants, as potatoes, will not absorb arsenic into their substance so as to make them poisonous. The Paris green is entirely on the surface of the plants, or on the ground, where it becomes so diluted with moisture and earth, as to be present, when ordinary quantities are used, only in harmless amount.

Mention has been made on a previous page, of the existence of arsenic in the coloring material of many wall-papers. This is wrong, and should be made criminal under the law. When the paper is dry, *arsenical dust* may get from it into the air of the room, in a quantity sufficient to do much harm, and even endanger life. In one instance under my knowledge, it seemed probable that a lady suffered a fatal illness from sleeping for several months in a room whose walls were covered with green paper containing arsenic.

Atropia:

Belladonna. *Atropia* is the alkaloid active principle of the plant, *Atropa Belladonna,* called also *Deadly Nightshade.* The berries of this plant have sometimes been eaten by children, with fatal effect. *Symptoms* of this poisoning are, dryness and heat of the mouth and throat, difficulty of swallowing, sickness of stomach, dizziness, dilatation of the pupils, imperfect sight, flushing of the face, delirium, convulsions, and finally stupor. When recovery occurs, some of these symptoms are slow to disappear.

Atropia may cause death in doses of *less than a grain;* perhaps as little even as but half a grain by the mouth, and still less when introduced under the skin by injection.

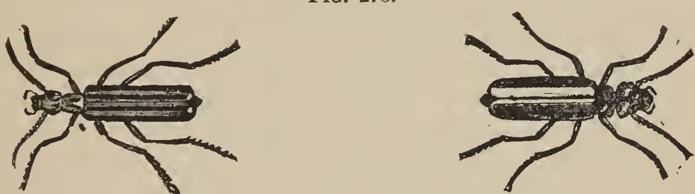
Treatment of poisoning by Belladonna or Atropia requires the prompt use of an emetic. Give at once a teaspoonful of mustard, or a tablespoonful of salt, in a teacupful of warm water. Repeat this (or ipecac. if at hand) in ten minutes if it does not cause vomiting; and accompany it with large draughts of warm water, in which finely powdered *charcoal* has been mixed; or better, charcoal and magnesia. Physicians have much confidence in the antagonism between *Atropia* and *Morphia* (or Belladonna and Opium); but that part of the treatment had best be reserved for professional skill and judgment. The principle of it is to give, by the mouth or by hypodermic injection, rather large doses of the antagonist alkaloid (morphia for atropia poisoning, or the converse), at intervals of half an hour or so, until relief is obtained, or the characteristic effects of the antidote appear. *Atropia* causes the pupils of the eyes to become very large; Morphia makes them contract; in this way the predominant influence of one or the other can be seen. A large dose of Morphia (sulphate or acetate) would be a quarter of a grain; of Atropia, one-thirtieth of a grain.

Bitter Almonds. Oil of Bitter Almonds, whose flavor is agreeable, contains a small amount of Prussic (Hydrocyanic) Acid; and this is a deadly poison. Twenty drops of Oil of Bitter Almonds may kill. *Symptoms* of this poisoning, which come on usually in a few minutes, are, extreme prostration, coldness, nausea, dilatation of the pupils, sometimes convulsions; in other cases stupor, with snoring respiration. Death is likely to occur within an hour. In *treatment,* we have no certain antidote. Dashing cold water repeatedly in the face and on the chest (drying it at once with a warm towel), or even over the whole body, is recommended; and the careful but repeated application of ammonia (smelling-salts) to the nostrils. Recovery from the effects of a large potion of this poison is, however, hardly to be expected.

Camphor. This is not mentioned among the poisons in books on Toxicology. A young relative of mine, however, as a boyish experiment, swallowed about a tablespoonful, or possibly more, of Spirits of Camphor. He lay in a stupor for six or eight hours, and then gradually recovered. I have never known another similar case; but this is mentioned to show the need of care in leaving powerful, even though familiar, drugs within the reach of children.

Cantharides. Spanish Flies. Ointment of Cantharides is used to raise blisters. The Tincture is occasionally employed as a medicine. In large doses it acts as an *irritant poison*, especially disturbing the urinary apparatus; *strangury* (difficult and painful discharge of urine) being its characteristic effect. Vomiting and purging also occur, and sometimes convulsions before death, which may not result for two, three, or more days. In *treatment*, as there is no chemical antidote for Cantharides, an *emetic* must be at once given (mustard, salt, or ipecac., with copious draughts of warm water), and may be followed by charcoal and

Fig. 278.



CANTHARIS VITTATA. CANTHARIS VESICATORIA.

magnesia water, or, if at hand, flaxseed-tea. Strangury may be best relieved by an injection of forty drops of laudanum, with a little starch, into the bowels; also, cloths wrung out of hot water may be applied over the bladder; or the warm hip-bath may be used with advantage.

Carbolic Acid. This is also called *Phenol.* It is to Coal-Oil (Petroleum) what Creasote is to Tar from wood. *Symptoms* of poisoning by either Carbolic Acid, Kerosene, or crude Petroleum, are those of an *irritant narcotic.* First there are burning of the mouth, throat, and stomach, pain in the abdomen, vomiting; then great prostration, faintness, coldness; lastly, insensibility and stupor, ending in death. A tablespoonful of the liquid Carbolic Acid will be pretty sure to cause death, in from half an hour to eight or nine hours. In *treatment* of this form of poisoning, we must first use an emetic (mustard, salt, or ipecac., with plenty of warm water), and then give the patient large draughts of *sweet oil.* If that is not on hand, *lime-water and milk*, freely given, will be likely to do good by shielding the coats of the stomach and bowels from the poison.

Castor-Oil Seeds. From these the entirely safe though disagreeable Castor-Oil is obtained; but, when swallowed whole, the seeds have sometimes (three or four or more taken at once) caused death, in the manner of an irritant poison, in less than forty-eight hours. In *treatment,* give first an *emetic* (mustard, salt, or ipecac., with abundance of warm water), and then flaxseed-tea or lime-water and milk; also teaspoonful doses of Paregoric, or ten or fifteen drops of Laudanum, every hour, until forty to sixty drops (if the latter be used) have been taken, to allay pain, vomiting, and purging.

Cheese. The daily papers, in April, 1884, mentioned two families having just been severely, but not fatally, poisoned in Brooklyn, by some English Dairy Cheese. A chemist who examined it thought the poison to be in the coloring-matter. The exact explanation of this occasional (rare) acquirement of a poisonous quality by cheese is yet wanting. (On this see page 286.) Unless made so by malicious intent a cheese not so spoiled by keeping as to have a harsh, unpleasant taste, is extremely unlikely to be poisonous; especially in such small or moderate amounts as it is wholesome to consume of even very good cheese.

Treatment for such poisoning must consist in the prompt use of an *emetic* (see **Aconite,** *Treatment*), followed by charcoal and magnesia or lime-water, and paregoric, or small doses of laudanum, to allay suffering. The instances of a fatal result from this cause are very few.

Chloral. *Hydrate of Chloral* is the right name of this medicine, which is much used, especially to promote sleep. It is very uncertain in its action upon different people. While some are but little affected by drachm (sixty-grain) doses, others will be considerably narcotized by half as much. Twenty or thirty grains will be an ordinary medicinal dose. Less than a drachm has been fatal in a few instances; *three drachms* would probably almost always kill; although some persons have taken much more with impunity. The *symptoms* of the poisonous action of Chloral are merely those of deep narcotism; the victim cannot be roused, and sleeps away to death, in a few hours. *Treatment* of it, in the absence of a certain antidote, consists in the immediate use of an *emetic,* followed by very strong *coffee* or *tea;* dashing cold water on the face and chest; if the patient can walk, moving him about, slapping the back and limbs briskly, etc., to keep him awake, as in opium-poisoning; for last resorts, the galvanic battery and artificial respiration. A physician may carefully try the antagonism which probably exists between *Strychnine* and Chloral.

Chloroform. This liquid is much used in Europe, but less than Ether in this country, as an *anæsthetic,* by being breathed to annul the pain of surgical operations. It is more dangerous, by far, than Ether

or Nitrous Oxide, in this mode of employment; and, of course, it should never be taken or given in this way by an unprofessional person. I was the first physician to experiment with its *internal* use, on my own person and afterwards on a number of others, in the Pennsylvania Hospital, in 1848. I found that a much larger quantity is safe in this way, by swallowing, than when it is breathed; and have since given it many times in teaspoonful doses, with only moderate soporific effect. A case has been reported of a boy *four years old* being killed by a drachm of Chloroform taken into the stomach. Deep stupor resulted, in which he died. While this gives reason for caution, it is not likely that less than four fluidrachms (half an ounce, about a tablespoonful), and probably not often that much, taken by the stomach, would produce death in an adult.

Symptoms of Chloroform poisoning are those of stupor, from which the patient cannot be roused. This may be preceded by signs of great irritation of the stomach; as Chloroform is very pungent and heating when swallowed. *Treatment* requires an *emetic* at once (see **Aconite,** *Treatment*); and then, as there is no chemical antidote, dashing cold water on the face and chest, and, if it can be obtained, the galvanic battery; as a last resort, artificial respiration.

Citric Acid. This is the natural acid of lemons, separated from them by a chemical process. It is only poisonous when taken in very large amount; an ounce or more. *Treatment* for this, as for other acid poisons, is, first, an *emetic* (see **Aconite,** *Treatment*), then magnesia, chalk or soda, or soap, to neutralize the acid.

Coal-Oil. See **Carbolic Acid.**

Cocculus Indicus. The berries of this Eastern tree are used in some places to poison fish. They are said also to be put, as an adulteration, into beer (in England), to increase its intoxicating power. Probably not much of this is really done. Their poisonous principle is *picrotoxin.* A tea made of Cocculus berries is sometimes employed to kill bedbugs, etc.; and occasionally this has been swallowed by mistake, with fatal result. The *symptoms* are, irritation of the stomach (pain, nausea, and vomiting), followed by a peculiar sort of narcotism; a half-awake lethargy, knowing what is going on, yet quite without power to speak or move.

Treatment for this poisoning, in the absence of any known antidote, must consist in the use of an *emetic* (see **Aconite,** *Treatment*), followed by draughts of warm charcoal and magnesia water, and strong tea or coffee; when the worst is over, allowing the patient to sleep it off at length.

Colchicum. This plant, Meadow Saffron, *Colchicum autumnale,* is used considerably in medicine; the Wine of the Root and the Wine of

the Seeds. By an overdose (a teaspoonful or more) violent vomiting, pain in the abdomen, purging and prostration are caused; in some instances it is fatal. *Treatment* for this poisoning should be the same as for that from **Castor-Oil Seeds**; which see.

Copper. While this metal, when pure, is not itself poisonous, its compounds are; and they are *made* by the action on copper of the fluids of the stomach, or by acids and other materials used in cooking, pickling, etc. In this way copper poisoning sometimes occurs, as well as among those working in copper. Mineral water (Carbonic Acid Water, Soda-Water) dissolves copper; hence reservoirs of that metal, without any, or with only an imperfect, lining of something not soluble, ought not to be used for it. The compounds of Copper most often acting poisonously are, *Blue Vitriol* (Bluestone), the *Sulphate;* and *Verdigris*, the *Subacetate* of Copper. In large amount taken at once, either of these will cause severe vomiting, pain in the abdomen, and purging; afterwards headache, and, in fatal cases, convulsions or paralysis before death. *Slow* poisoning will result from taking small amounts of copper daily, as in cooked or pickled articles, for a length of time. Symptoms of this are, a coppery taste in the mouth, with parched tongue and throat; nausea, retching, perhaps vomiting; pains in the stomach and bowels; diarrhœa, with straining; weakness, with nervous restlessness; dizziness, cold sweats, cramps, and at last convulsions.

Treatment for rapid Copper poisoning (as it is itself an emetic) should consist in giving an abundance of *whites of eggs;* albumen making a harmless compound with copper. *Milk* may be given freely if no eggs are at hand; its effect is of the same kind. For *slow* Copper poisoning, the main thing is to *withdraw the cause*, in whatever thing or things it may exist. Then, a milk diet, with moderate doses of an opiate, as Paregoric, or small doses of Laudanum, to assuage the pain and diarrhœa, will be suitable.

Corrosive Sublimate. This, the Chloride of Mercury, is a deadly poison; three or four grains of it may kill a man. *Symptoms* of its action are, in a marked degree, those of the irritant poisons; a metallic taste, burning in the mouth, throat, and stomach, pain in the abdomen, vomiting, purging, with straining, nervous anxiety, extreme prostration; often convulsions, sometimes stupor, before death. Commonly, death does not result under one or more days; but examples are recorded of its taking place within an hour after the poison had been swallowed. *Treatment* of Corrosive Sublimate poisoning requires (as for copper) free administration of *whites of eggs;* the more the better, until relief is obtained; or, if eggs cannot be had, large and repeated draughts of *milk.*

Creasote. This, obtained from Tar, has poisonous properties much resembling those of **Carbolic Acid**; which see.

Croton Oil. Obtained from the seeds of the plant called *Croton tiglium;* this oil is a very powerful cathartic, as well as an irritant to the skin. One drop of it will purge severely. Thirty drops have been known to kill, with symptoms of irritant poisoning; namely, vomiting, pain in the abdomen, violent diarrhœa, and prostration. For *treatment* of these symptoms, so caused, see **Castor-Oil Seeds.**

Cyanide of Potassium. See **Hydrocyanic Acid.**

Digitalis. *Foxglove* is the common name in England for this purple-flowered plant. The leaves are used in medicine, chiefly in the form of a Tincture. Its active principle, *Digitalin,* is a powerful poison.

Not many cases of death from taking either Digitalis or Digitalin have been reported. The *symptoms* resulting from either of them are, vomiting, purging, pain in the abdomen, dizziness, disordered sight, dilated pupils; the pulse full and slow while the patient is lying down, but becoming rapid and weak when he sits up. Later, prostration and faintness follow, with an irregular pulse; towards the last, delirium, convulsions, and stupor. Death does not generally occur under twenty-four or thirty-six hours; although in one case it is asserted to have taken place within an hour.

Treatment of Digitalis poisoning, as of that of other agents for which we have no certain antidotes,* must consist of the use of an *emetic* (see **Aconite,** *Treatment*), unless *copious* as well as frequent vomiting has already occurred; and then charcoal and magnesia-water, with such cautious use of stimulants (ammonia, whisky, external heat, the galvanic battery) as the symptoms appear to call for; and, if all else fails, artificial respiration.

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* *Aconitia* is said to be a physiological antidote for Digitalin; but it is itself too potent a poison to be dealt with by any but skilful professional hands.

Ergot. *Secale cornutum*, or *Spurred Rye;* this is a kind of parasitic vegetable growth upon the grain of common Rye; most frequently met with on damp grounds in some parts of Northern Europe. Before its qualities were understood, whole communities were sometimes more or less severely poisoned by it; the worst symptom attending its use as food being *gangrene* of the extremities. Wine of Ergot is largely used as a medicine, especially in cases of sluggish labor, or for the arrest of *hemorrhage*. I do not know of any cases of fatal poisoning by overdoses of this preparation. If any one should be made ill by such, or by the Fluid Extract of Ergot, taken by mistake, an *emetic*, followed by charcoal and magnesia-water, would be proper in the treatment.

FIG. 279.

SPURRED RYE.

Ether. Although much safer than chloroform as an *anæsthetic*, breathed to produce insensibility under surgical operations, or to mitigate the pains of labor, Ether may possibly be inhaled to such an extent as to cause dangerous and even fatal narcotism. In such a case, the *pulse* fails; it flutters, and almost or quite ceases. When complete insensibility has been brought on by any anæsthetic, as shown by the arm dropping at once when lifted, by deep breathing, and by the lids not closing forcibly when they are opened with the fingers, then the ether, chloroform, or nitrous oxide should be withdrawn at once. In using ether in child-labor, it is not needful or desirable to produce entire insensibility. The "edge" may be taken off of severe pains in the second stage of labor (expulsive pains) by the patient beginning to breathe the ether from a sponge wet with it and held near the nostrils, *as soon as a pain begins;* and continuing it only for a minute or two with each pain. If, under anæsthesia, the pulse ceases to be felt, the breathing becomes feeble, and the face shows collapse, dash cold water in the face; put a bottle of ammonia under the nose for a moment at a time; and, if reaction is slow, lift the patient's heels above his head for a few seconds; then, if necessary, begin artificial respiration. (See **Drowning.**)

Fish, *Poisonous.* Accounts are given of certain kinds of fish, chiefly in tropical climates, being unwholesome and even dangerous food. I have never heard of any such in this country. Most cases so reported are probably instances of "idiosyncrasy"; that is, peculiarity of individual constitutions. Those so affected may require an emetic, if the irritating undigested article remains in the stomach. If the bowels are not already purged freely, charcoal and magnesia will be appropriate; and perhaps moderate doses of paregoric or laudanum may be called for (although not nearly always so) to allay lingering pain and distress of the stomach and bowels.

Fungi. *Mushrooms* and *Truffles* belong to this group of plants; both being largely eaten, and agreeing with most persons. Botanists inform us that there are many species of innocent and nourishing fungi; but there are some, also, that are dangerously poisonous. While, then, the *general rule* is, that those whose color is not dark, nor taste harsh, nor odor disagreeable, are harmless, *experiments* are not safe in such a matter, when made by those ignorant of the kind they have found. The true *eatable Mushroom, Agaricus campestris,* grows on open ground, has *pink* "gills" or a frilled arrangement underneath its crown, a small "ruffle" also on its stem, and a thin skin on top, which can be peeled off easily. The assertion made by some that even this plant is unsafe until cooked does not agree with my experience; as I have often eaten at least a small handful of mushroom plants raw, without any injury. Still, they may under some circumstances be less wholesome, and cooking improves their flavor as well as secures their innocency. *Symptoms* of "toadstool" poisoning are those of irritant poisoning; vomiting, purging, and abdominal pains; with, also, dizziness, partial blindness, delirium, perhaps convulsions and stupor, at least in fatal cases. Generally, the symptoms do not show themselves for a number of hours, if the *irritant* effects are most prominent; but *stupefying* effects have sometimes appeared within an hour or two.

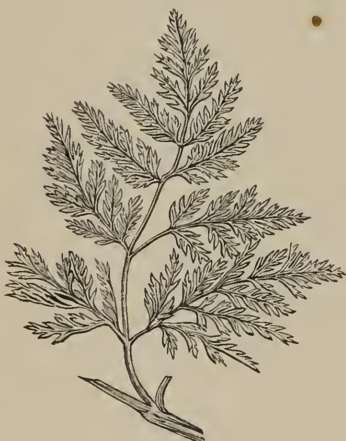
No *antidote* for fungus-poisoning having been ascertained to exist, the proper *treatment* for it is, the use of mustard, salt, or ipecac. as an *emetic,* followed by charcoal and magnesia-water, and then stimulants (ammonia, whisky, etc.), if required by great debility; lime-water and milk for nourishment (later, beef-tea, etc.); and, if irritation and pain without stupor be present, careful use of moderate doses of some opiate, as paregoric or laudanum, to assuage distress and procure relief.

Hellebore. Three plants go by this name: *Black* Hellebore (*Helleborus Niger*), *Green* Hellebore (*Veratrum Viride*), and *White* Hellebore (*Veratrum Album*). These are all poisonous when taken in considerable dose; the *White* Hellebore the most so, containing as its active principle *veratria*.*

Black Hellebore is sometimes given, in the form of a tea, in England, for worms; but it is not a safe domestic medicine. Death has sometimes resulted from its use, with symptoms like those of cholera-morbus.

Green or *American* Hellebore, *Veratrum Viride*, is not infrequently prescribed by physicians as a sedative medicine, in the form of a *Tincture*, in doses of two or three drops at a time. In large dose, it will kill, chiefly by *prostration*. *Veratria*, in a dose less than one-twelfth of a grain, has caused alarming effects. Two grains of it will kill a

FIG. 280.



HEMLOCK.

FIG. 281.

PARSLEY.

cat in less than a minute. *White Hellebore* depends for its action on this powerful alkaloid.

Treatment of Hellebore or Veratria poisoning requires, first a brisk *emetic* (see **Aconite**, *Treatment*), and then *stimulants;* as *ammonia* and *laudanum*. The last-named has seemed in several cases to be especially useful; but it must be given with caution, so as not to substitute one kind of poisoning for another in an excessive degree.

Hcml ck. Socrates, the Greek philosopher, was put to death by this poison (*Cicuta* of the ancients; now *Conium maculatum*). It is a *depressant;* not very unlike Tobacco and Lobelia in its effects. Sometimes Hemlock has been eaten by mistake for Parsley; to which it has

* Probably present also in Green Hellebore (*Veratrum viride*).

some resemblance in appearance. *Aethusa cynapium,* Fool's Parsley, is another poisonous plant, growing wild in New England, which has been sometimes eaten by mistake for parsley. *Prostration* and loss of power to move are the chief *symptoms* of its action; the mind being clear of stupor or even delirium to the last. Plato describes Socrates as conversing calmly with his disciples until near his end.

Treatment of Hemlock poisoning must be by an *emetic* (mustard preferred), followed by *stimulation,* with *ammonia, whisky* (*small doses* at short intervals), *heat* to the body and limbs, and, as last resorts, the galvanic battery and artificial respiration.

FIG. 282.

FOOL'S PARSLEY.

Hydrochloric Acid, *Muriatic Acid,* the old name for this, is still much used. It is not so strong an acid as Sulphuric Acid (Oil of Vitriol), but its effects are of the same kind. The smallest fatal dose recorded is half an ounce (about a tablespoonful). Much larger quantities have been taken without destroying life. The *symptoms* are those of *irritant* poisoning. (See **Sulphuric Acid** for these symptoms, and also for their **Treatment.**)

Hydrocyanic Acid. The common name for this is **Prussic Acid.** It is one of the most deadly of all known poisons. Yet, in small

amount, it is present (or is easily formed from) several familiar things; as peach-flowers, leaves, and kernels, bitter almonds, apple-seeds, stones of the cherry, plum, and apricot, the root of the mountain ash, and the flowers of the cherry-laurel. Water distilled from this last (cherry-laurel water) is quite poisonous. In all these, it is not the acid itself that is present, but two substances which readily form it, when mixed together with water. Prussic acid is used in medicine in the condition of *Dilute Hydrocyanic Acid.* It is of two strengths; the *officinal,* two parts in one hundred of water; and *Scheele's,* containing about five parts in one hundred. The medicinal dose of the *officinal* Prussic Acid is one drop. Fifty or sixty drops will generally be a fatal dose. The *symptoms* are those of sudden and extreme *prostration;* coming on in a minute or two, and ending life in from *ten to fifteen minutes.* Time for *treatment* is thus seldom allowed. *Dashing cold water* repeatedly upon the face and chest, and careful breathing and swallowing of *Ammonia,* are about all that can often be done. Dessertspoonful doses of whisky or brandy, a few times, will be appropriate. It would be right to try also, in so desperate a case, the quick and powerful stimulation of *limited strong heat;* by touching the pit of the stomach and the middle of the back, alternately, with the end of a poker, or a piece of stout wire, heated not quite to a red heat at the nearest fire, gas, lamp, or candle flame. Electricity, an analogous excitant, can seldom be had ready in time for this kind of poisoning.

Cyanide of Potassium has precisely the same effects as Prussic Acid, in doses still smaller. It is used by photographers and in electrotyping. *Treatment* of poisoning from it should be the same as for Hydrocyanic Acid.

Hyoscyamus. The *Henbane* (*Hyoscyamus niger*) has a root like a small parsnip, and has occasionally been eaten by mistake for it. Poisonous effects result from this, as well as from swallowing the seeds or leaves. An extract from the leaves is used in medicine. *Symptoms* of Hyoscyamus poisoning are: dryness of the throat, with difficulty of swallowing; enlargement of the pupils, and dimness of vision; headache, ringing in the ears, dizziness, vomiting; later, delirium, sometimes convulsions and paralysis, and stupor, which may end in death. *Treatment* of such poisoning, at least in the absence of a physician, should consist of the immediate use of an *emetic* (mustard, salt, or ipecac.), followed by charcoal and magnesia-water, freely given.

Iodine. Several preparations containing this substance are used in medicine; but they are not very likely to be taken poisonously. Were this to happen, the effects would be chiefly those of an *irritant* poison. The *antidote* for Iodine is *starch;* if it is not on hand in a pure state, flour and water, or rice-water, made thick, will supply it sufficiently well.

Jamestown Weed. See **Stramonium.**

Jessamine. The Yellow Jessamine (*Gelsemium sempervirens*) contains an alkaloid, *Gelseminia*, which has produced death in the dose of one-sixth of a grain; with symptoms of irritant and depressant poisoning. Of course the plant itself is dangerous only when swallowed in much larger amount. An *emetic*, charcoal and magnesia-water, and stimulation with ammonia and whisky, etc., would be the proper treatment for such poisoning.

Kalmia. The common laurel of lower Pennsylvania (Wissahickon woods near Philadelphia) and elsewhere, also called Sheep Laurel, *Kalmia Latifolia*, has long had the reputation of being poisonous. Thomas Meehan, one of the best scientific botanists in America, recently (*Gardener's Monthly*, 1884), on the basis of experiments by chemists who found no poisonous principle in it, denies its poisonous quality altogether. He is probably right; but there is no occasion for risking anything by eating it.

Laurel. See **Kalmia,** above. The *Cherry Laurel* has in its leaves the ingredients which, with water, make *Prussic Acid.* See **Hydrocyanic Acid.**

Lead. While metallic Lead is not poisonous, many of its compounds are so. The one most nearly inert is the Sulphate of Lead. Hence Sulphuric Acid, and its salts, as Sulphate of Magnesium, are antidotes for it. Sugar of Lead (Acetate of Lead) and the Subacetate, present in Goulard's Extract, which are often used to make Lead-water, are sometimes taken poisonously by mistake. Violent vomiting and purging, with very severe pains in the abdomen, followed by prostration, have been the symptoms in such cases; death taking place (if the quantity was very large) in from one to three days. *Treatment* for such *acute* or sudden poisoning by Lead, should consist in the use, if vomiting is not copious, of an emetic dose (twenty to thirty grains) of Sulphate of

Zinc, followed by whites of eggs in abundance, milk, and moderate doses of Sulphate of Magnesium (Epsom Salts); with warmth applied to the body, and opiates (as Paregoric or Laudanum) to relieve pain when the most urgent symptoms have been overcome.

Slow or *chronic* Lead poisoning is much more common. Workmen engaged in the separation of Lead from its ores, or in the manufacture of "white" and "red" Lead, lace-whiteners, card-glazers, painters, and also glaziers, plumbers, pewterers, and those who glaze pottery, are all exposed to it. Sleeping in a freshly-painted room affects some persons. Cooking-vessels lined with glazing containing Lead, and fruit or vegetable cans in which it has been used in the soldering process, when acid fruits or vegetables have been kept for some time in them, make such articles of food more or less poisonous. Mineral (carbonic acid) water in leaden reservoirs becomes so. When leaden pipes are used to carry the liquid from such reservoirs, so much of the carbonic acid water as remains long in the pipes dissolves enough lead to be injurious. Beer or cider drawn through leaden pipes is likewise tainted. Using shot to clean wine-bottles, leaving some shot in the bottles and again filling them with wine, exposes it to this action. Wrapping tobacco in tinfoil ("patent" tinfoil) which contains lead, as *pure* tinfoil does not, is unsafe for the same reason. Hair dyes, to blacken the hair, generally contain Lead, and serious poisoning, once at least fatal, has resulted from their free and frequent use; and the same is true of some enamels, etc., for the complexion. (Another objection to these last is the fact that sulphur, or sulphuretted hydrogen gas, will *blacken* such cosmetics; with a frightful effect occasionally upon the faces so meant to be adorned.) Water may be poisoned by passing through leaden pipes, under certain circumstances. Not always, clearly; as the tens of thousands of hydrants in the cities of New York, Philadelphia, and others, are so supplied. But so much has been said about this in a previous part of this book, that we may refer concerning it to **Water Supply**, under **Our Homes**, in **Hygiene**.

Two kinds of slow Lead poisoning occur; *Lead Colic* and *Lead Palsy*. Both of these have been considered in our alphabetical series, under **Special Diseases**. As, also, they are always sufficiently prolonged for opportunity to exist to obtain medical advice, their treatment does not require here to be dwelt upon.

Ley. See **Potassa**.

Lime. Especially *unslaked* Lime, being strongly alkaline, is *caustic*, and irritating to the stomach and bowels. Its effects, if largely swallowed, are those of the *irritant* poisons; vomiting, purging, abdominal pains, and subsequent prostration. *Treatment, vinegar* and water, or

lemon-juice (both *acids*, to *neutralize* the alkaline earth, lime) and water, quickly and abundantly given.

Lobelia. Indian Tobacco, *Lobelia inflata*, a common small plant in this country, has long been popularly used as a medicine. Tincture of Lobelia is a valuable remedy for attacks of asthma. In overdose, it is very poisonous, with a *depressant* action, resembling that of tobacco. The "Thomsonian" system of pseudo-medicine used Lobelia freely, and thereby has been charged * with sacrificing the lives of thousands of persons. *Symptoms* of Lobelia poisoning are; vomiting, sometimes purging, extreme prostration; in some instances convulsions before death.

In *treatment* of Lobelia poisoning, as we have no special antidote, we can only depend upon an *emetic* (mustard preferred), followed by charcoal and magnesia-water, and *stimulation*, with ammonia, whisky, etc., and heat applied to the body.

Lunar Caustic. See **Nitrate of Silver.** Its antidote is *common salt.*

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* By Dr. Beck, in his Medical Jurisprudence.

Mercury. This metal, in the pure state, is not poisonous; but several of its preparations are so; notably **Corrosive Sublimate**; which see.

Morphia. See **Opium.**

Mushrooms. See **Fungi.**

Mussels. On the coast of Europe, in many places, these are used extensively for food; but now and then they make people ill; whether because of their peculiar "idiosyncrasy," or on account of a change in the mussels, it is very hard to ascertain. The *symptoms* are generally others of irritant poisoning; an eruption on the skin like nettle-rash being also common. Death has sometimes resulted. In *treatment*, an *emetic*, and charcoal and magnesia-water, are appropriate.

Nitrate of Silver. *Lunar Caustic* is the common name for this. It is a powerful irritant poison. If swallowed by accident or mistake, the *symptoms* of its action will be like those of *corrosive sublimate* poisoning, only less rapid and violent. The *antidote* for Nitrate of Silver is *common salt* (*chloride of sodium*); which makes with it the harmless *chloride of silver.* Let salt be taken, a tablespoonful at a time, in water; its emetic action will be an advantage.

Nitric Acid. *Aqua Fortis* is an old commercial name for this powerful acid. Two teaspoonfuls of it swallowed will generally destroy life. *Breathing its fumes* has repeatedly caused death within ten to fifteen hours. *Symptoms* of Nitric Acid poisoning, and their *treatment*, are the same as those of the other mineral acids. See **Sulphuric Acid.**

Nux Vomica. See **Strychnia.**

Oil of Bitter Almonds. See **Bitter Almonds.**

Opium. This is the most powerful and frequently used of the sleep-producing (*hypnotic*) and anodyne (pain-relieving) medicines. *Morphia* is its most characteristic and important active principle. *Laudanum*, *Paregoric*, and McMunn's Elixir are familiar preparations containing it. The effects on the human system of all these are very much the same, in different degrees.

Four or five grains of solid Opium will generally kill a person not habituated to it; and this amount is represented in a *teaspoonful* of Laudanum, in a *wineglassful* of Paregoric, and in a *grain* of Sulphate, Acetate or Muriate of Morphia. The regular American Solution of Morphia contains one grain of Sulphate of Morphia in each fluidounce; *Magendie's* solution of Morphia contains *sixteen* grains in each fluidounce. While, therefore, about two tablespoonfuls of the American solution

will be the smallest poisonous dose, a half-teaspoonful of Magendie's Solution will be equally dangerous.

Under the heading of *Stimulants* and *Narcotics*, in Part II., on **Hygiene**, attention has been given to the enormous doses taken by those who have long been accustomed to the use of Opium. Those suffering extreme pain, also, sometimes bear much larger than usual medicinal amounts; but the increase of the quantity in such cases requires a great deal of care. Children are remarkably susceptible of the influence of opiates. Very small doses of laudanum, paregoric, etc., should be given to a child, before ascertaining its individual liability in this respect. Laudanum, when long kept, grows stronger; we should be especially cautious, therefore, in giving the last drops of an *old* bottle of laudanum.

Symptoms of any kind of Opiate poisoning are: in not very excessive dose, at first a short period of excitement; in overwhelming dose, this is absent and the deep stupor comes almost at once; with closed eyes, whose pupils, if the lids be raised, are seen to be contracted; pulse slow and full; breathing snoring (stertorous); face flushed and skin warm, until near the end, when pallor and coldness precede death. The slowness of the breathing in bad cases is very remarkable. The condition on the whole bears a close resemblance to *apoplexy, dead drunkenness,* and *compression of the brain* from fracture of the skull. In neither of these, however, are the pupils contracted as in Opium-poisoning. Death usually follows within from seven to twelve hours.

Treatment of Opium-poisoning calls first for an *emetic;* a teaspoonful of mustard, a tablespoonful of salt, or a teaspoonful of ipecac., in warm water, should be poured down the throat at once, if the patient can swallow. When this is not possible, a physician will use a *stomach-pump.* After the emetic, if Tincture of Belladonna can be obtained, let twenty drops of it be given every half hour until the pupils begin to dilate. This is advised because of the frequent experience showing that *atropia* (the alkaloid of Belladonna) and *morphia* antagonize each other in their effects upon the human system. If a physician is on hand, he will be likely, instead, to administer *atropia hypodermically;* that is, through and under the skin, in doses of one-twentieth of a grain each time, watching its effects. Also, cold water should be dashed upon the face, and the patient's body may be slapped vigorously, or, if he can, he may be made to walk about; anything to *keep him awake,* or from sinking into the fatal degree of lethargy. (Observe how different a case this is from that of *apoplexy,* or of stupor from *fracture of the skull.* In either of *those* conditions, the patient should be kept *as quiet as possible;* brain-rest is then *indispensable* to give a chance of recovery.) The *galvanic battery,* applied to the back and chest, and *artificial respi-*

ration (see **Drowning**) are last resorts in Opiate poisoning. Touching the back and pit of the stomach lightly but repeatedly with a very hot iron (*e. g.*, the end of a piece of thick wire, etc.) will be worth trying for the same *rousing* effect. If the patient begins to improve so as to swallow, strong tea or coffee will assist in removing the narcotism.

Oxalic Acid. A small amount of this gives the sour taste to sorrel and to the leaves of rhubarb (pie-plant). When pure, it is a crystalline solid, enough in appearance like Epsom salts to have been occasionally taken for it. In taste, however, it is very different. The smallest amount ever fatal is a drachm; half an ounce or an ounce may easily be so. *Symptoms* of its action are those of an *irritant* poison (see **Corrosive Sublimate**, etc.), with extreme prostration, and also headache, delirium, and convulsions before death. A very large dose may kill *in a few minutes;* generally death results within an hour. In exceptional instances, it has happened after several days.

Treatment of Oxalic Acid poisoning must be, the immediate use of *something containing lime*, mixed with water or oil. Chalk will answer best, unless lime-water is at hand, to be used freely. *Magnesia* will do, if there is no lime or chalk within reach. Scraping plaster from a wall and giving it to the patient will be better than to wait half an hour to send to a druggist, as there is no time to lose.

Phosphorus. This substance, a small portion of which is always naturally present in our brains and in our bones, is, when in the separate state, a most destructive poison. It acts rapidly; when, for example, ends of lucifer matches are swallowed, through mistake or malice. It is known also to act slowly, in producing disease of the jawbones, with those engaged in making lucifer matches. *Symptoms* of acute or rapid Phosphorus poisoning usually begin to appear a few hours after it is taken. There is a garlicky taste, with burning in the throat, pain in the stomach, violent vomiting, sometimes purging; coldness, prostration, and either convulsions or stupor before death, which may follow in from one to five or six days. The amount necessary to kill an adult is less than a grain. A child two years old is reported to have died in consequence of swallowing the ends of eight friction-matches; and two of these have killed an infant two months old.

Treatment of Phosphorus poisoning must be conducted without any known antidote, unless old *spirit of turpentine*, in teaspoonful doses, be such, as some have asserted. First give an *emetic* (see **Aconite**, *Treatment*), with plenty of warm water; then *charcoal and magnesia-water*, abundantly. No *oil* (unless oil of turpentine, as above said) is to be given after Phosphorus poisoning; oil dissolves and diffuses it more rapidly. Rice-water, milk, or flaxseed-tea will be suitable to allay irritation, in a case which escapes death.

Potassa. *Caustic Potassa*, or Potash, is a powerful destroyer of animal tissues; having a very strong affinity for water. *Ley* contains it in considerable amount. Its effects, when swallowed, are those of an *irritant* poison. (See **Corrosive Sublimate**, etc.) Injury of the throat may remain for a long time. *Treatment* must be by an *emetic*, and the *neutralization* of the *alkali* potassa with an *acid;* as *vinegar* or *lemon-juice* promptly and freely given, in an abundance of water. Afterwards, flaxseed-tea, milk, rice-water, etc., will be appropriate, to soothe the inflamed stomach and bowels.

Prussic Acid. See **Hydrocyanic Acid.**

Sausage Poisoning. The history of this is quite obscure. Most of the cases have been reported in Germany, where *uncooked* sausage-meat is often eaten. Some of the deaths are undoubtedly to be accounted for by *trichinosis.* (See the account of the spiral thread-worm, *trichina*, under **Worms.**)

Probably spoiled sausage may sometimes acquire a poisonous property without these parasites. The symptoms described as following sausage poisoning are those of an *irritant-narcotic* kind. *Emetics* and charcoal and magnesia-water will constitute a reasonable treatment for them.

Soda. This alkali, when pure, is *caustic*, like potassa. What is commonly called Soda, however, is the *Bicarbonate of Sodium.* This is not poisonous; although tablespoonful doses would be irritating and

Fig. 283.

JAMESTOWN WEED (STRAMONIUM).

unwholesome for the stomach. For the *symptoms* and *treatment* of poisoning by caustic Soda, see **Potassa.**

Stramonium. *Datura Stramonium* is the botanical name of the common Jamestown (often called *Jimson*) weed. *Thorn-apple* is another name for it. The seeds are sometimes eaten by children, with fatal effect. Both the seeds and the leaves are sometimes used in medicine.

Symptoms attend Stramonium poisoning, of the same kind, essentially, as those resulting from Belladonna or Atropia. For an account of these, therefore, and the *treatment* thereof, see **Belladonna.**

Strychnia. This violent poison is contained in the fruit of the *Nux Vomica* (Dog buttons), a tree native to India. *Brucia* is another poisonous alkaloid present with it in the same fruit or seeds, and in a few

other plants. One nut or seed of Nux Vomica is a fatal dose for an adult; of Strychnia, half a grain has killed a man. *Symptoms* of this kind of poisoning are quite peculiar. Almost immediately after taking it, great restlessness comes on, with a feeling of suffocation. Soon follow jerking movements of the arms, legs, and head; and then a *tetanic* condition (like that of lockjaw) in which all the muscles of the body become stiffly contracted; the body making an arch, resting upon the head and heels. The mind is at the same time unaffected. After a minute, more or less, this spasmodic attack gives way; but it is repeated in half an hour or so; being hastened by any sudden sound, touch, or other sensation. Death results in some cases in a few minutes; in others, not under several hours. The average time is about two hours.

Treatment. Give at once an *emetic* of *mustard, salt,* or *ipecac.,* with large drinks of warm water. Then use *chloroform,* carefully, by inhalation. Lay a handkerchief single over the patient's face; and drop upon it, near the nostrils, *one drop at a time,* of chloroform, until the breathing and other movements are quieted. Then remove the handkerchief, but renew the dropping when another tetanic spasm appears to be beginning. The *internal* use of chloroform, in teaspoonful doses, well diluted with water, is also recommended; having saved life in recorded instances. This is heroic treatment; but there is hardly any more terrific poison to deal with than Strychnia.

Sulphuric Acid. Oil of Vitriol. A heavy liquid, very corrosive. Swallowing a teaspoonful of it may kill a grown person, within twenty-four hours; chiefly from suffocation. Sometimes death is almost immediate. With smaller quantities, burning pain, vomiting and prostration are the symptoms.

Treatment. At once, soda, magnesia or chalk, freely given in large draughts of water or milk, if the patient can swallow; if not, there is little hope of recovery. A physician may, in bad cases, use the stomach-pump, or perhaps open the windpipe to prevent death by suffocation.

Tartar Emetic. See **Antimony.**

Tartaric Acid. The natural acid of grapes. It is present in *cream of tartar* (bitartrate of potassium). In doses as large as an ounce, or perhaps less, it is an irritant poison. Its *symptoms* and their proper *treatment* are the same as those of **Citric Acid**; which see.

Tin. Pure metallic Tin is not at all poisonous. Water may be kept, boiled, or conveyed in vessels or pipes made of it, with entire safety. If it is ever alloyed with lead, which is said to be the case with one kind of patent *tinfoil*, and some other cheap tin now made, this is an injurious fraud. It is doubtful whether even the long-continued action of vinegar, or of the acid of fruits, in cans of pure tin, will dissolve enough of the metal to become unwholesome. Bits of *solder*, consisting partly of lead, may sometimes drop into the contents of cans; and these fragments, if swallowed, will be likely to produce lead poisoning. One should use the tongue, watchfully, before swallowing each mouthful of anything taken from a tin can.

Dyer's Spirit, a preparation containing the chlorides of Tin, is an irritant poison of moderate power. Very few instances of its being injuriously taken are recorded.

Toadstools. See **Fungi.**

Tobacco. Containing a very poisonous volatile liquid alkaloid, *nicotin*, the leaves of the Tobacco plant are capable of destroying life, when a portion is swallowed, or even long applied in a moist state to a considerable part of the surface of the body. Two cases are recorded, also, of death from excessive smoking; one from seventeen, and the other from eighteen pipes at a single sitting.

Probably a grown man, unaccustomed to the use of Tobacco, might be fatally poisoned by swallowing the whole of a single strong cigar. *Symptoms* of Tobacco poisoning are dizziness, restlessness, vomiting, sometimes purging, and extreme prostration. It is a *depressant* poison. *Treatment* should be, the use of a mustard or salt *emetic*, followed by *ammonia* as a stimulant, with warmth to the body and rubbing the limbs to excite reaction.

Zinc. *Pure* Zinc is not poisonous. The Zinc commonly used, however, contains some antimony and lead, a little arsenic, and other impurities. It is not a safe thing, therefore, to store water in, or to line cooking-vessels, etc., with.

Sulphate of Zinc (White Vitriol) is a powerful *irritant* poison. It produces vomiting at once, and therefore seldom kills unless in very large doses; half an ounce or an ounce at once. *Symptoms* and *Treatment* of such poisoning are like those of other metallic irritants. See **Corrosive Sublimate,** or **Copper.** *Chloride of Zinc* is used in solution as a disinfectant, under the name of Burnett's Fluid. It is still more corrosive and irritant than the Sulphate. See **Copper,** for *symptoms* and *treatment* of such poisoning.

PART VII.

OLD AGE AND DEATH.

WE ALL DO FADE AS A LEAF.

NOT many persons die a perfectly natural death. This, as was said earlier in this book, *ought* to take place not much, if at all, before the end of the hundredth year. Yet many persons may truly enough be considered to die of old age, without having any manifest disease, at ninety, or even eighty-five years; indeed, possibly, before their eightieth year.

Opportunity to observe very closely the last stages of one slowly declining life, with a less direct acquaintance with several others, has confirmed my view, that old age is, in several respects, a second childhood. The development seen in infancy, during the first five years of life, is, more gradually, *reversed*, in those who live to be from eighty-five to a hundred years old. The changes most noticeable are these:

1. *Wasting.* The least necessary part of the body, the fat, first disappears; causing the shrivelled appearance of the figure, and the deeply wrinkled face and bony hands. Then the muscular flesh is absorbed, with accompanying loss of strength; which, however, is less felt because of the little weight left to be moved about.

2. *Food* is wanted to be taken *often*, though not in large amounts at once. After seventy, the old man should take food four times a day; after eighty, even five times will be better; milk being an important part of his diet. Near ninety, almost all his food should be liquid; especially as the teeth have (with few exceptions) gone long before. It is true that the dentist's art, by supplying artificial teeth, when "the grinders cease because they are few," has now made very advanced age more possible. Beef-tea, or beef-essence, not filtered, but warmed and spiced moderately with red pepper, will greatly help out the diet of those who are very aged.

3. More and more hours of *repose* are required. They may not be all hours of sound sleep; as old persons often do not sleep so many

hours continuously as those who are younger. But every one over sixty should spend *at least* eight hours of the twenty-four in bed or reclining on a couch. After seventy, the hours of repose should never be less than nine; after eighty, ten; and at or near ninety, half or more of the old man's time will most naturally and advantageously be spent at rest.

4. Childhood is repeated also in the feebleness of mental power, from the wasting of the brain. The memory goes first; especially the recollection of recent events. Far off remembrances, of early days, and of those of middle life, come up almost as freshly as ever; but what happened yesterday, or even to-day, is easily forgotten. The power to reason closely, or to give attention very long to one subject, next gives way. We need not dwell on the dimness of sight and dulness of hearing, which are among the usual (but not universal) infirmities of age. In all these particulars, there is a very great variety in individuals. Some of those who live the longest retain till the last more of their original mental capacity, with good sight, hearing, and muscular strength, than those whose life-energy is exhausted not much after the end of four-score years.

5. *Temperature* is lowest in the aged; and resistance to cold is, with them, feeble. A very old person should be sure to wear a sufficiency of warm clothing, and should not sleep in a room where the thermometer marks less than 50° Fahr. Such a one risks death from *cold stroke* by even walking out of doors when the temperature approaches zero.

Life ends, *before* old age, through **general exhaustion** from disease, or through failure of one or more of the three great organs, the **heart, lungs,** and **brain.** Cessation of the *heart's* action may be called *death* by *syncope;* that by interference with the function of the *lungs, asphyxia*; from oppression of the *brain, coma.* Exhaustion of the whole system constitutes *asthenia.*

Sudden death may result from apoplexy; or rupture of the heart, which had undergone fatty degeneration; or very copious bleeding from the lungs or bowels; or bursting of an aneurism or an abscess within the chest, or of an aneurism within the abdomen; or suffocation; or exhaustion from violent over-exertion, or from effort too severe or prolonged for the strength to endure; or shock; as from violent mental agitation, of grief, fear, or even joy.

Observation of not a few death-beds has given the writer the impression that much suffering at the time of death is the exception rather than the rule. A natural *anæsthesia* precedes the moment of dissolution; when the eye grows fixed, and the lips scarcely move, there is but little,

if any, sensibility left; and even the last convulsive movements, which sometimes have the aspect of agony, are usually unconscious. The most natural mode of death has almost as little violence in it as the burning out of a candle in its socket.

> Pale Twin of Sleep, why do men dread to meet thee?
>   For all Earth's ills, thy anodyne is best.
> Come gently, Death; then weary Life will greet thee,
>   As greets the sun the rosy-curtained West.

INDEX OF LOCAL DISORDERS AND INJURIES.

INDEX OF DISEASES.

INDEX OF ACCIDENTS AND INJURIES.

INDEX OF POISONS.

INDEX OF CLASSES OF REMEDIES.

SICK FOODS.

INDEX OF MEDICINES AND OTHER REMEDIES.

For Doses of Medicines, see page 615.

[On *administration* of medicines, see page 640, under NURSING.]

GENERAL INDEX.

GLOSSARY.*

A.

Abdomen. In common language, the stomach or belly.

Abductor. Drawing from, or apart.

Aberration. Wandering, or going away from a certain line or place.

Abortion. Miscarriage; childbirth before full time.

Abscess. A gathering; an inflammation, with formation of liquid matter, called *pus*.

Absinthe. A poisonous intoxicating liquor used in France.

Absorbent. Soaking up liquids readily.

Absorption. The drawing or soaking up of a liquid into a tube or solid substance.

Acarus. A very small creeping animal, something like a tiny spider.

Acclimatize. To make accustomed to a new climate.

Accommodation. In the eye, the change by which sight is adapted to near things.

Acid. In chemistry, a substance which reddens litmus-paper and unites with alkalies.

Acne. A disease of the skin; most common on the face.

Aconite. A plant whose root and leaves are poisonous; used sometimes as a medicine.

Acute. Applied to a disease, sharp, violent, and not continuing long.

Adductor. Drawing to or together.

Adult. Grown up; of full age.

Adulterate. To add something not belonging to a substance.

Aëration. Supplying air to a person, place, or thing.

Æsthetic. Having to do with fine taste or feeling.

Afferent. Bearing to or toward a centre.

Affinity. Attraction between different kinds of substances.

After-birth. The round flat mass to which the navel-cord is attached in childbirth.

Agitans. Shaking; applied to a kind of palsy.

Ague. Chills and fever; intermittent fall fever.

Albumen. The white of egg. It is also found in the blood of men and animals.

Albuminuria. Albumen in the urine; one of the signs of Bright's disease.

Alcoholism. The general effect upon the body of alcoholic intemperance.

Alkali. In chemistry, a substance which unites with acids, and changes the yellow of turmeric to brown.

Alloy. A compound of two or more metals.

Allspice. Pimento; a pleasant, pepper-like article used for seasoning food.

Alluvial. Deposited from rivers, lakes, or the sea.

Alterative. Something which changes the condition of a part of, or the whole constitution of, the body.

Altitude. Height above the level of the sea.

Amalgam. A compound of mercury with some other metal.

Amaurosis. Blindness from failure of the nerve of sight.

Amenorrhœa. Stopping or delay of a woman's monthly courses.

Amœba. A very small animal, consisting of one cell.

Amputation. Cutting off a limb.

Amylaceous. Starch-like.

Anaconda. A very large serpent of South America.

Anæmia. Thinness or poverty of the blood.

Anæsthesia. Loss of feeling; insensibility.

Anæsthetic. Something which destroys feeling, as ether or chloroform.

Analysis. In chemistry, separating the elements of a substance from each other.

Anasarca. Dropsy all over the body.

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* Medicines or diseases not named in this Glossary will be found in the alphabetically arranged sections of this book, beginning on pages 553 and 661.

Anatomy. The study of the parts of a human or animal body.

Aneurism. An enlargement of part of an artery, usually containing a clot of blood.

Angina. Distress, threatening suffocation.

Aniline. A substance got out of coal tar, used for the manufacture of dyes, etc.

Animalcule. A very tiny animal; for instance, that which causes the itch.

Annihilate. To bring to nothing; to destroy utterly.

Anodyne. Capable of relieving pain.

Anomalous. Very uncommon; out of usual order.

Anomaly. An extraordinary or irregular thing.

Anorexia. Loss of appetite.

Antacid. Something which neutralizes or destroys the effects of acids.

Anteversion. Turning forward (as of the womb).

Anthelmintic. Capable of killing or driving out worms.

Anthrax. Carbuncle, an extremely bad sore; also, a disease of sheep.

Antidote. Something given to neutralize or prevent the effects of a poison.

Antiphlogistic. Opposed or giving relief to inflammation.

Antipyretic. Capable of lessening the heat of the body in fever.

Antiscorbutic. Preventive or curative of scurvy.

Antiseptic. Preventive or corrective of rottenness or decay.

Anus. The outlet from the bowels.

Aorta. The largest artery in the body; going out from the heart.

Aperient. Opening; applied to medicines which move the bowels.

Apex. The pointed end of anything; for example, of the heart.

Aphasia. A disease of the brain, attended by loss of speech.

Aphonia. Loss of the voice.

Aphthæ. Small white formations in a sore mouth.

Apoplexy. A stroke of brain disease, often fatal.

Appetizer. Something which improves the appetite.

Aqueous. Watery.

Arachnoid. Spider-web-like; applied to one of the membranes covering the brain.

Areola. A small space or area; as around the nipple.

Aromatic. Spicy.

Artery. A blood-vessel which carries blood outward from the heart.

Artesian. Named from a place, *Artois;* applied to a very deep well.

Articulation. Pronouncing syllables and words; *also,* a joint.

Asphyxia. Loss of pulse; suffocation.

Assimilate. To make one thing like another; in physiology, to make digested food like the material of the body.

Asthenia. Loss of strength; weakness.

Asthenopia. Weakness of the eyes, affecting the sight.

Asthma. A distressing disease, with difficulty of breathing.

Astigmatism. A defect of sight, giving things a wrong shape.

Astringent. Shrinking together, so as to check a discharge.

Ataxia, ataxy. Disorder, irregularity.

Athletic. Active; fond of exercise and feats of strength.

Atmosphere. The common air everywhere around us.

Atomization. Making a fine spray of a liquid.

Atony. Loss of tone or energy.

Atrophy. Wasting away.

Auditory. Belonging to the hearing; as the auditory nerve.

Auricle. One of the smaller chambers of the heart.

Auscultation. Listening; a mode of examination in diseases of the lungs and heart.

Automatic. Going of itself; like an automaton.

B.

Bacillus. A very small club-shaped *microbe* (which see).

Bacterium. A kind of *microbe* (which see).

Benign. Favorable; not destructive.

Beverage. A drink (as distinguished from a medicine).

Bicarbonate. A compound of two portions of carbonic acid with another substance.

Biceps. Two-headed: the name of a large muscle of the arm.

Bicuspid. Having two cusps or projections: the name of one of the valves of the heart.

Bile. A yellowish-green liquid secreted by the liver.

Bilious. Belonging to the bile; often applied to a disorder of digestion.

Bitartrate. A compound of two portions of tartaric acid with another substance.
Bituminous. Pitch-like; applied to soft coal, etc.
Blonde. Of a fair complexion.
Blue vitriol. Sulphate of copper.
Botany. The science of plants.
Bright's Disease. A disorder chiefly affecting the kidneys, named after Dr. Bright.
Bronchia. The larger windpipe, branching into the lungs.
Bronchitis. Inflammation of the bronchial air-tubes.
Bronchocele. Goitre; a swelling in front of the throat.
Brunette. Of a dark or brown complexion.
Bunion. A swelling on one of the toe-joints, larger than a corn.

C.

Cachexia. An unhealthy condition or habit of body.
Caffein. The strongest active principle of coffee.
Calcify. To bring to a condition like chalk or lime.
Calcium. The metal of which lime is the oxide.
Calculus. In medical language, stone in the bladder.
Calisthenics. Light exercises to promote beauty and strength.
Calomel. A drug containing chlorine and mercury.
Cancer. A diseased growth, usually fatal unless early removed.
Canine. Belonging to or resembling a dog.
Canker. A bad kind of sore mouth.
Cannabis. Indian hemp.
Capillary. Like a hair; applied to very small blood-vessels.
Capsule. A small sac or bag.
Carbohydrate. Made of carbon and water; examples, sugar and starch.
Carbolic acid. A substance got out of coal tar, used as a disinfectant.
Carbonic acid. A gas given out in breathing and from burning wood, coal, etc.
Carbuncle. A very bad gathering, larger and worse than a boil.
Cardiac. Belonging to or near the heart.
Cardialgia. Heart-burn; pain near the heart.
Caries. Decay of a tooth or bone from inflammation.
Carminative. Something used to relieve colicky pain.
Carnivorous. Living on flesh as food.
Carotid. One of the large arteries of the neck.
Carpus. The wrist.
Cartilage. Hard gristle; for example, the ear.
Casein. The curdy part of milk or cheese.
Casualty. An accident or a disaster.
Catalepsy. A disease in which the muscles become fixed in one position.
Cataplasm. A poultice.
Cataract. A film or opacity in the lens of the eye, causing blindness.
Catarrh. A running of phlegm from the nose, windpipe, etc.
Cathartic. A medicine acting on the bowels; purgative.
Catheter. An instrument used to draw water from the urinary bladder.
Caustic. Something which burns and destroys a part.
Cell. A very small sac or bag (seen through the microscope).
Centenarian. One who lives a hundred years.
Cephalalgia. Headache.
Cerate. An ointment partly made with wax.
Cerebellum. The smaller brain.
Cerebro-spinal. Belonging to the brain and spinal cord.
Cerebrum. The larger part of the brain (in man and the higher animals).
Cesspool. A privy well.
Chalybeate. A name given to medicines containing iron.
Chilblain. Frost-bite.
Chloral. A medicine used to promote sleep or relieve pain.
Chlorate. A substance containing chloric acid.
Chloride. A compound of chlorine with another substance.
Chloroform. A liquid drug sometimes breathed to prevent pain under surgical operations.
Chlorohydric acid. A compound of chlorine and hydrogen; muriatic acid.
Chlorosis. A disease of women or girls, sometimes called "green sickness."
Cholæmia. Bile in the blood.
Chorea. A jerking disease: St. Vitus' dance.
Choroid. One of the coats or layers of the eyeball.

Chromate. A compound of chromic acid.
Chronic. Lasting for a considerable time.
Chrysalis. The *cocoon* stage of an insect's life.
Chyle. What food becomes when perfectly digested in the small intestine.
Chyme. What food becomes under the action of the gastric juice in the stomach.
Cilia. Eyelashes; also, very small lash-like hairs seen only through a microscope.
Circulation. Moving of a fluid round and round; for example, that of the blood in the body.
Citrate. A compound of citric acid, the acid of lemon-juice.
Clavicle. The collar-bone.
Clonic. Fixed, rigid; not jerking.
Coagulate. To clot.
Cochlea. A part of the *internal* ear.
Co-education. Education of boys and girls, or men and women, in the same schools or colleges.
Colitis. Inflammation of the colon or large intestine.
Collapse. Giving way; a state of extreme weakness.
Collodion. A solution of gun-cotton in ether.
Colloid. Jelly-like.
Colon. The large intestine; the lower part of the bowels.
Color-blind. Unable to tell one color from another.
Colostrum. The first milk from the breast after childbirth.
Coma. Deep stupor, from which a person cannot be roused.
Complementary. Making the set full: red and green light together make full white light; they are complementary to each other.
Compose. To quiet and make comfortable.
Composite. Made up of several things.
Compound. Made of two or more elements or parts. In surgery, a compound fracture is one in which a piece of bone sticks out through the skin.
Concave. Hollowed out, like the inside of a watch-glass.
Conception. The first beginning of life in a child in the womb.
Concussion. A shaking up or jarring.
Condiment. Something used to season food, as pepper, etc.
Conductor. Something which carries; for example, copper wire is a conductor of electricity.
Congenital. Beginning with birth.
Congestion. Settling of blood in a part.
Conjunctiva. The outermost coat or covering of the eyeball.
Consanguineous. Nearly related; as brother and sister, etc.
Conscious. Knowing what is going on.
Conservancy. Foul matter of privies, slops, etc. which has to be removed.
Constipation. Stoppage or slow action of the bowels.
Constituent. Something which is a part of something else.
Consumption. A wasting disease, in which the lungs are commonly most affected.
Contagious. Catching, from person to person.
Contaminate. To make foul; to defile.
Convalesce. To get well of a disease.
Convection. Conveying, as of heat, through a medium, as air.
Converge. To come together toward one point.
Convex. Rounded outward; as the outside of a watch-glass.
Convolution. A rolled or rolling part of the outside of the brain.
Convulsion. A fit.
Copperas. Green vitriol; sulphate of iron.
Cordial. An agreeable warming or stimulating drink.
Cornea. The transparent coat or covering of the eyeball under the *conjunctiva.*
Corolla. The showy part of a flower; composed of *petals.*
Corpus. A body.
Corpuscle. A very tiny body.
Corrode. To eat or wear away; as strong acids do metals.
Cortex. The bark or outer covering.
Cosmoline. Another name for *vaseline,* a soft material used instead of ointment.
Cosmopolitan. At home in any part of the world.
Costive. Slow, tight, not easily moved; applied to the state of the bowels.
Counter-irritant. Something used to heat up the *outside* of the body, to relieve an irritation *within* it.
Coxalgia. Hip-joint disease.
Cranium. The skull.
Creasote. A liquid obtained from tar; used as a medicine and to relieve toothache.
Cremometer. An instrument to measure the cream on milk.
Cretaceous. Chalky or chalk-like.

Cretin. One who is dwarfed and stupid, as some children are in Switzerland and other places.
Cryptogamous. Having no flowers; for example, ferns.
Cutaneous. Belonging to the skin.
Cyanosis. The blue disease, in which the face is blue or purple.
Cyst. A small bladder.
Cystitis. Inflammation of the urinary bladder.

D.

Debility. Weakness.
Decimal. A tenth part; applied to the system of counting which goes by tens, hundreds, thousands, etc.
Decoction. What is got by boiling anything in water.
Decompose. To break a thing up into its elements.
Degeneration. Getting worse; going down from health and strength to weakness and disease.
Deglutition. Swallowing.
Delirium. Wandering in mind, flightiness.
Delivery. Childbirth.
Dementia. Loss of the powers of the mind.
Demulcent. Something soothing.
Dengue. A mild kind of fever; "break-bone fever," of the South.
Dense. Thick; containing much matter in a small space.
Dental. Belonging to the teeth.
Dentifrice. A toothwash.
Dentine. Tooth-bone.
Dentition. The growth and coming out of the teeth.
Depression. A state of low strength; great weakness.
Desiccate. To dry up, by driving water out.
Dew-point. The degree of the thermometer at which moisture begins to settle on a cooling body.
Diabetes. A disease in which an excessive amount of urine is passed.
Diagnosis. Finding out the nature of a disease.
Diagonal. A line across from one corner to another.
Diagram. A figure drawn to explain something.
Diameter. The shortest distance across a surface.
Diaphoretic. Causing increase of sweat (perspiration).
Diaphragm. The rounded muscle between the chest and the abdomen.
Diarrhœa. Looseness of the bowels.
Diathesis. An unhealthy condition or habit of body.
Dicrotous. Double.
Diet. What we eat and drink.
Digestion. The action of the stomach, etc. on food.
Digit. A finger (in anatomy, also, a toe).
Dilatation. Stretching out, enlargement.
Diphtheria. A disease in which "false membrane" is formed; especially in the throat.
Diplopia. Seeing double, as "cross-eyed" persons do.
Dipsomania. Insane thirst for intoxicating drink.
Disgorge. To throw up or out.
Disinfect. To purify air, water, etc. from things which cause disease.
Dislocate. To put out of joint.
Disorganize. To break up the structure or organization of anything.
Distil. To drive off by heat, and collect a part in a cold vessel.
Diuretic. Acting on the kidneys, increasing the flow of urine.
Drastic. Very strong and severe.
Dropsy. Swelling from water collecting under the skin or inside of the body.
Duct. A tube or channel through which a liquid passes.
Duodenum. The first twelve inches of the bowel next to the stomach
Dysentery. A disease of the bowels with pain and bloody discharges.
Dysmenorrhœa. Pain at the time of a woman's monthly courses.
Dyspepsia. Difficult and painful digestion.
Dyspnœa. Difficulty of breathing.
Dysuria. Obstruction of the passage of urine from the bladder.

E.

Eccentric. Going out from a centre; applied to a person odd, peculiar.
Eczema. A disease of the skin, a kind of tetter.
Efferent. Carrying something outward from a centre.
Effervesce. To bubble up, as soda-water, beer, etc. do.
Effete. Worn out; used up; done with.
Effusion. A pouring or flowing out.
Elephant leg. Large and hard swelling of the leg; *elephantiasis.*

Emaciation. Wasting away; loss of fat and flesh.

Embryo. A very young, unborn child or animal.

Emetic. A drug which will, when taken, cause vomiting.

Emmenagogue. Promotive of monthly flow from the womb.

Emotional. Belonging to the feelings.

Emphysema. Swelling of the skin with air under it.

Empyema. A collection of pus (matter) in the chest.

Empyreumatic. Produced by the action of fire.

Encephaloid. Brain-like.

Encephalon. The contents of the head; the brain.

Endemic. Applied to a disease prevailing in a certain place.

Endocarditis. Inflammation of the inner lining of the heart.

Endosperm. The inside lining of a seed or ovum.

Enema. An injection into the bowels.

Enteric. Belong to an intestine (bowel).

Enteritis. Inflammation of the bowels.

Enthetic. Introduced into the body from outside of it.

Entomology. The science or study of insects.

Ephemeral. Living but a day or a short time.

Epicure. One who is very fond of pleasant living.

Epidemic. Prevailing or spreading from place to place.

Epilepsy. A disease in which convulsions (fits) occur habitually or frequently.

Eruption. A breaking out on the skin.

Erysipelas. A spreading inflammation of the skin.

Espionage. A French word meaning spying out or close inspection.

Etherize. To put one under the action of ether.

Etiology. The study of causation.

Eustachian tube. The small channel connecting the ear with the nose.

Evacuation. Emptying; clearing out (as of the bowels).

Evaporate. To pass or drive off in vapor.

Exanthema. An eruption or eruptive disease. (See *Eruption.*)

Excito-motor. Belonging to a movement resulting from excitation or stimulation.

Excrement. The "stools" or passages from the bowels.

Excrete. To throw or pass out waste matter from the body.

Excretion. That which is passed out as waste matter.

Exhale. To breathe out.

Exophthalmic. Accompanied by enlargement of the eye.

Exotic. Not native; brought from some other country.

Expectorate. To cough up or discharge something from the chest.

Expiration. Breathing out, exhalation.

Extract. Something got by a process out of a bulky or complex substance.

Extremity. One of the limbs of a man or animal.

Exudation. A material oozing out of some of the blood-vessels of the body.

F.

Fahrenheit. The name of the inventor of the thermometer most in use in this country.

Faradization. Application to the body of an interrupted current of electricity.

Farinaceous. Starch-containing, as arrowroot, rice, etc.

Febrile. Feverish.

Feces. The "stools" or passages from the bowels.

Felon. In surgical language, a severe inflammation of a finger.

Femur. The thigh-bone.

Fermentation. A change in a substance, one result of which is giving out gas.

Fertilize. In physiology, to so act upon a germ that it will develop into a plant or animal.

Fibrin. The substance in the blood which makes it clot.

Filament. A thread or thread-like, delicate form.

Filter. To pass a liquid through something which keeps back the particles and impurities.

Fissure. A crack or slit.

Fistula. An opening in a part which, when sound, is closed.

Flatulence. Wind in the stomach or bowels.

Flexible. Easily bent.

Flexion. The act of bending or being bent.

Flexor. Bending; for example, one of the muscles which bend the fingers to the hand.

Florid. Applied to the complexion, red, flushed.

Fluctuation. A wave-like movement.
Flush. In sanitary arrangements, to pour a stream of water through a tube or channel.
Focus. A point at which rays of light or heat come together.
Fœtus. An unborn child.
Fontanelle. A soft place where the bones meet in the head of a newborn child.
Foot-ton. One ton lifted a foot; a term used in measuring powers of different kinds.

G.

Gall-bladder. The bag under the liver which receives and stores away the bile.
Gall-duct. The tube which carries bile from the gall-bladder to the bowel.
Galvanize. To apply galvanic electricity to anything.
Ganglion (plural, ganglia). A nerve-centre.
Gangrene. Mortification; death of part of a living body.
Garbage. Kitchen and table refuse.
Gargle. To hold a liquid in the throat a while without swallowing it.
Gastric. Belonging to the stomach.
Gastritis. Inflammation of the stomach.
Generation. Begetting offspring.
Genitals. Private parts of the body.
Germ. A seed or spore; the first beginning of a living plant or animal.
Gestation. Pregnancy; carrying a child in the womb.
Gin-liver. The diseased liver caused by excessive drinking of spirits.
Gland. An organ in the body which separates something from the blood; as the liver, kidneys, etc.
Glanders. A disease of the horse, sometimes conveyed to men.
Glaucoma. A painful and serious disease of the eyeball.
Glucose. Grape-sugar.
Gluten. The pasty matter in wheat and other grains.
Goitre. A swelling in front of the throat; called also *bronchocele.*
Gonorrhœa. A nasty disease caught in impure intercourse.
Graduated. Marked to degrees or otherwise, as thermometers, etc. are.
Gramme. A little more than 15 grains.
Granulate. To break up into a coarse "grainy" powder.
Graphite. Black lead, a kind of mineral.
Gravel. In medical language, small pieces of stone in the urinary bladder.
Gravitation. Weight.
Gravity, specific. The weight of a certain bulk of a substance, compared to that of an equal bulk of something else.
Green vitriol. Sulphate of iron.
Gullet. The swallowing part of the throat.
Gustatory. Having to do with taste.
Gynæcology. The science or study of the diseases of women.

H.

Hæmatemesis. Vomiting of blood.
Hæmophilia. A tendency to bleed from the slightest wound.
Hard water. Water which will not easily make suds with soap.
Hasheesh (Hashish or Haschish). Indian hemp.
Heartburn. Pain in the neighborhood of the heart; often from indigestion.
Heat-stroke. Sudden illness from exposure to great heat.
Hemiopia. Seeing only half of anything looked at.
Hemiplegia. Palsy of one half of the body.
Hemisphere. Half of a globe or sphere; for example, of the earth.
Hemorrhage. Loss of blood from any cause.
Hemorrhoids. Piles; small swellings near the outlet from the bowels.
Hepatic. Belonging to the liver.
Herbivorous. Eating plants, as grass, grains, etc.
Hereditary. Passing from parents to children.
Hermaphrodite. Having both sexes at once.
Hernia. Rupture; a part of a bowel, etc. being forced out of its natural place.
Hiccough (pronounced *hiccup*). A quick, jerking kind of breathing, from disorder of the stomach or from great weakness.
Humerus. The arm-bone between the shoulder and elbow.
Humidity. Moisture, dampness.
Humus. Soil; earth in which plants will grow.
Hydatid. A watery bladder-like growth in some part of an animal's body.
Hydrate. A compound of water with some other substance.
Hydraulic. Belonging to or acting by means of water.

Hydrocephalus. Dropsy in the head; water on the brain.
Hydrochloric acid. Muriatic acid.
Hydrocyanic acid. Prussic acid; a deadly poison.
Hydrometer. An instrument to show how much water a substance (as spirits) contains; also used to find the *specific gravity* (which see) of liquids.
Hydrophobia. The disease caused by the bite of a mad dog.
Hydrothorax. Water in the chest.
Hygiene. The science of the preservation of health.
Hygrometer. An instrument to show the amount of moisture in the air of a place.
Hyoid. Shaped like the letter U.
Hypæsthetic. Lessening sensibility; partly benumbing feeling.
Hyperæmia. Too much blood in a part of the body.
Hyperæsthesia. Tenderness to the touch, beyond what is natural in health.
Hypermetropia. Long-sightedness; inability to see very near objects.
Hyperopia. Same as *Hypermetropia.*
Hypertrophy. Overgrowth.
Hypnotic. Promotive of sleep.
Hypnotism. A kind of artificial or unnatural sleep or somnambulism.
Hypochondriac. One who suffers from imaginary disease.
Hypodermic (Hypodermatic). Under the skin.
Hysteria. A disorder of the nervous system, most common in young women; sometimes connected with disorders of the womb.
Hysterical. In a state of nervous disturbance, beyond the control of the will.
Hysterics. Violent laughter, crying, or convulsions, etc., which the person cannot help.

I.

Idiosyncrasy. A personal peculiarity; something in which one person differs from almost all others.
Idiot. A simpleton, a natural dummy.
Ileum. A part of the bowel or "small intestine."
Ileo-colic. Belonging to the ileum (see above) and the colon (large intestine).
Ilium. The hip-bone.
Illuminate. To light up.
Imago. A perfectly-formed insect, as, for example, a butterfly.
Imbecile. Silly; without sense.
Immersion. Dipping or plunging,
Impermeable. Not allowing anything (water, for instance) to soak through it.
Impervious. Same as *Impermeable.*
Incidence. The act of striking or falling upon anything.
Incisor. Cutting or nipping.
Incontinent. Not able to hold in (as, for example, water in the bladder).
Indigestion. Failure in the disposal of food in the stomach.
Inebriant. Having an intoxicating effect.
Inebriate. A drunkard.
Inebriety. Drunkenness.
Infection. Prevalence of the cause of a disease in a place, which may then be said to be *infected.*
Inflammation. Redness, heat, swelling, and pain in any part of the body.
Influenza. An epidemic of "bad colds."
Infusion. A mixture made by soaking something in water without boiling.
Infusoria. Tiny living things seen by the microscope in infusions of various kinds.
Ingredient. Something contained in a substance.
Inhalation. Inbreathing; drawing in breath, either of air or of other gases or vapors.
Inoculate. To put something under the skin, so as to affect the condition of the body.
Insalubrious. Not healthy.
Insane. Crazy; unsound in mind.
Insoluble. Not capable of being dissolved.
Insomnia. Sleeplessness.
Instinct. An impulse shown by an animal to do something in a certain way.
Insular. Belonging to or like an island.
Intellect. The mind; the thinking power or powers.
Intercostal. Between the ribs.
Interment. Burial.
Intermittent. Having regular changes; for instance, chills, one every day or every other day.
Intestine. A bowel,
Intussusception. Catching of one part of the bowels in another (like a stove-pipe).
Iodide. A compound of iodine with another substance.
Iodine. A violet-colored element, obtained from sea-weed.

Iris. The ring around the pupil of the eye.

Iritis. Inflammation of the iris.

Irrigate. To flood or pour water over land, etc.

Isothermal line. One marking equal temperatures in different places on the earth.

J.

Jamestown weed. A poisonous wild plant, the *Datura Stramonium.*

Jaundice. A disease in which the body becomes yellow all over.

Jugular vein. A large vein on each side of the neck.

K.

Kakelung. A large stove or heater used in Sweden and Norway.

Kilogramme. A weight, according to the metrical system, equal to somewhat more than 2 pounds.

Kindergarten. A school for young children, where play is turned into drill and instructive work.

L.

Labor. In medical language, the process of childbirth.

Labyrinth. In anatomy, the bony structure of the internal ear.

Lacerate. To tear.

Lachrymal gland. The tear-gland, within the bony socket of the eye.

Lacteals. In anatomy, the small vessels which take up chyle from the intestine.

Lactic acid. The principal acid of sour milk.

Lactin. Sugar of milk.

Lactodensimeter. An instrument to show the *density* (specific gravity, which see) of milk.

Lactometer. An instrument to show the quality of milk.

Laparotomy. Opening the belly by a surgical operation.

Larva. The grub or worm-like state of an insect.

Laryngitis. Inflammation of the upper part of the windpipe.

Larynx. The organ of the voice; first part of the windpipe.

Latitude. Distance of a place from the equator.

Laudanum. A strong medicine, the tincture of opium; poisonous in large doses.

Lavatory. A wash-room.

Laxative. Something which acts gently on the bowels.

Leaven. Yeast; a material used in raising bread.

Lens. A form of glass (or other transparent material) used in spectacles, microscopes, etc.

Leprosy. A severe disease of the skin, met with only in certain countries.

Leucocyte. A white blood-corpuscle; seen by aid of the microscope in great numbers in the blood.

Leucocythæmia. *White-cell blood;* a disease attended by an excessive number of white corpuscles in the blood.

Leucorrhœa. The "whites;" a kind of discharge not uncommon in women.

Leukæmia. Same as *Leucocythæmia.*

Lichen. A pimply disease of the skin.

Ligament. A tough fibrous band, such as gives strength to the joints, etc.

Liniment. Something used to bathe or rub the surface of the body for sprains, rheumatism, etc.

Litmus-paper. Paper so prepared that it is reddened by acids, for which it is therefore a test.

Lobe. A more or less regular part or division of anything; as of a leaf, a lung, or the liver.

Lochia. The flow which women have for a time after childbirth.

Lockjaw. A fixed condition of the jaws from disease; *trismus* or *tetanus.*

Locomotor ataxy. A disease in which the legs are not perfectly under control of the will.

Longevity. Length of life.

Longitude. Distance of a place east or west of a certain line.

Lumbago. A painful affection of the back and loins; most common in elderly people.

Lumbar. Belonging to the lower part of the back.

Lumbricoid. Resembling the earthworm.

Lymph. A clear liquid found in the lymphatic vessels of the body; resembling the watery part of the blood.

Lymphatics. The small vessels which take up lymph from various parts of the body, so that it can be returned to the blood.

M.

Maize. Indian corn.
Malady. Disease of any kind.
Malar. The anatomical name of the cheek-bone.
Malaria. Literally, "bad air;" commonly applied to the atmospheric cause of autumnal fevers.
Malignant. Destructive; tending constantly toward death.
Mammal. The name describing a class of animals, all of which suckle their young.
Mania. The most common kind of insanity.
Maniac. An insane person.
Manipulation. Working with the hands, often used for *massage*.
Marasmus. A wasting disease, chiefly affecting the bowels.
Maritime. Belonging to the sea.
Marrow. The fatty matter inside of bones. *Spinal* marrow, the nervous cord within the backbone.
Masculine. Belonging to man; contrasted with *feminine*, belonging to woman.
Massage. Rubbing and kneading the skin and flesh, to improve the circulation, relieve pain, etc.
Masseur. A man who practises *massage;* a manipulator.
Masseuse. A woman who practises *massage.*
Masticate. To chew.
Maternity. Motherhood.
Maximum. The *greatest* sum, degree, etc. of any series of things or events.
Medium. Literally, the *middle;* applied variously in medicine and in connection with other subjects.
Medulla. Marrow.
Megrim. Neuralgia of one side of the head and face.
Melancholy. Lowness of spirits; tendency toward despair.
Mellitus. Honeyed.
Membranous. Spread out in a flat, thin layer (membrane).
Meningitis. Inflammation of the *meninges*. the membranes covering the brain.
Menorrhagia. Excessive flow of monthly discharge in a woman.
Menses. The monthly "courses" of women.
Menstrual. Belonging to the "menses" of women.
Menstruation. The occurrence of the monthly flow in women.
Menthol. A solid preparation of the oil of mint.
Mesentery. The thin serous membrane covering the bowels.
Mesmerism. Animal magnetism.
Metacarpus. The bony part of the hand next above the fingers.
Metamorphosis. A change of form and condition in anything.
Metatarsus. The bony part of the foot next above the toes.
Meter. A measure nearly equal to $3\frac{1}{10}$ feet.
Meteorology. The science or study of the weather.
Methomania. An insane craving for intoxicating drink.
Metrical. The name given to the *decimal* system of weights and measures.
Microbe. A very minute living thing, seen only by aid of the microscope.
Micrococcus. One form of *microbe* (plural, *micrococci*).
Microphyte. A very minute vegetable form (*microbe*).
Microscopic. So small as to be seen only by aid of a microscope.
Milk leg. A swelling of the leg following childbirth.
Milk sickness. Illness caused by drinking the milk of cows which have eaten poisonous food.
Milliard. A thousand millions.
Milligramme. One-thousandth of a *gramme;* a *gramme* is about 15 grains.
Minim. One-sixtieth part of a fluid-drachm; about an average drop.
Miscarriage. Abortion; birth of a child before its time.
Molar tooth. A back or jaw tooth; a grinder.
Mole. A red or brown mark on the face or elsewhere on the body.
Molecule. A very tiny particle.
Mollusk. A soft-bodied animal, as an oyster, clam, etc.
Monomania. Insanity on one subject.
Monotony. Continued going over and over the same thing.
Monsoon. A wind which blows half the year in one, and the other half of the year in the opposite, direction.
Monstrosity. Something strange and unlike anything common or natural.
Morbid. Diseased.
Morphia. The principal agent contained in opium.

Mortality. The liability to or actual occurrence of death.

Mortification. Death of a part; sloughing, gangrene.

Motor. Having to do with motion.

Mucus. Phlegm; the thick liquid formed in the nostrils, windpipe, etc. on *mucous membranes.*

Muriatic acid. A strong acid liquid, called also *hydrochloric* or *chlorohydric* acid.

Muscæ volitantes. Flying specks, rings, etc. before the eyes.

Myalgia. Pain in the muscles; most common in the back.

Myosin. A substance obtained by chemists from flesh.

N.

Narcotic. Something which stupefies, as opium, chloral, etc.

Naturalize. To enable an animal or plant to live in a different country from its own.

Nausea. Sickness of stomach short of vomiting.

Necrosis. The death of a part; applied especially to decaying bones or teeth.

Nephritis. Inflammation of the kidney.

Nervine. Acting favorably on the nervous system.

Neuralgia. Nerve-pain.

Neurasthenia. Nervous debility.

Neurataxia. Disorder of the nervous system.

Neurotic. Acting as a medicine on the nervous system.

Neutralize. To oppose and stop the action of anything.

Nicotine. The chief poisonous principle in tobacco.

Nitrate. A compound of *nitric* acid with some other substance.

Nitrite. A compound of *nitrous* acid with something.

Nitrogenous. Containing a portion of the element nitrogen.

Nocturnal. Belonging to or occurring in the night.

Non-conductor. Not carrying electricity, heat, etc.

Normal. Regular; according to the rule or usual nature of things.

Nutrition. Nourishment.

O.

Obesity. Fatness.

Oblique. Slanting.

Oblongata. Prolonged, extended.

Obstetrics. Midwifery; the art and science of safe delivery in childbirth.

Octogenarian. A person over 80 years of age.

Oculist. One skilled in the care and treatment of the eyes.

Œdema. Dropsy of a part of the body; water under the skin.

Œsophagus. The gullet; lower part of the swallowing part of the throat.

Oil of vitriol. Sulphuric acid.

Oinomania. Insane craving for wine or other intoxicating drink.

Oleaginous. Oily.

Omnivorous. Eating all sorts of food, vegetable and animal.

Opacity. Non-transmission of light.

Opaque. Not allowing light to pass through; the opposite of *transparent.*

Ophthalmic. Having to do with sight.

Ophthalmoscope. A mirror arranged for looking at the interior of the eye.

Optic. Belonging to the eye or sight.

Organ. An instrument.

Organic. Belonging to an organ or organized body.

Organism. An organized body; that is, an animal or a plant.

Organize. To form into an organism. *Figuratively*, we sometimes speak of organizing a society, etc.

Ornithology. The scientific study of birds.

Orthopnœa. Difficulty of breathing, requiring the person to sit up instead of lying down.

Ossification. Turning into bone.

Otalgia. Earache.

Otolith. Ear-stone; one of the tiny stone particles found in the internal ear.

Outré (French). Outlandish; extraordinarily strange.

Ovariotomy. Removal of an ovary by a surgical operation.

Ovary. One of the female organs of reproduction.

Ovum. An egg.

Oxidation. Combination of something with oxygen.

Oxide. A compound of oxygen with a metal or some other elementary body.

Ozæna. A disease of the interior of the nose, with an unpleasant discharge.

Ozmazone. The brown outside part of roast meat.

Ozone. A modification of oxygen gas,

present in variable quantity in the atmosphere.

P.

Palatable. Agreeable to the taste.
Palpation. Examining by touch and gentle pressure.
Palpitation. Violent beating of the heart.
Palsy. Loss of feeling, or of power, or both.
Pancreas. The sweetbread; a gland near the stomach.
Paralysis. Palsy (which see).
Paralyze. To cause paralysis (palsy).
Paraplegia. Palsy (loss of power and feeling) of both legs.
Parasite. An animal or plant which lives on the substance of another.
Paregoric. A tincture of opium and camphor.
Parotid gland. A small gland near the angle of the jaw, which forms saliva.
Paroxysm. A spell or attack of any disorder.
Parturient. Bearing a child.
Pelvis. The bony basin enclosed by the large hip-bones.
Penetrate. To pierce into or through.
Peninsula. Land jutting out into the sea.
Pepsin. A substance formed in the stomach and taking part in digesting food.
Percussion. Knocking, tapping; a mode of examination of the chest or abdomen.
Perennial. Lasting through a number of years.
Perforate. To bore through.
Pericarditis. Inflammation of the outer covering of the heart.
Pericardium. The outer covering of the heart.
Perineum. The crotch between the thighs.
Periodical. Happening at regular times.
Periodicity. The fact or property of recurrence at regular periods.
Periphery. The outer part of anything; circumference.
Peristaltic contraction. The natural movement, from above downward, of the muscular coat of the bowels.
Peritoneum. The delicate membrane lining the abdomen and covering all the organs contained therein.
Peritonitis. Inflammation of the peritoneum.
Permeate. To pass all through.
Pernicious. Very injurious.
Perspiration. Sweat.
Pertussis. Hooping cough (whooping cough).
Phalanges. The joints or separate pieces of the fingers and toes.
Pharmacy. The business of an apothecary (pharmacist).
Pharyngitis. Inflammation of the pharynx.
Pharynx. The upper portion of the swallowing part of the throat.
Phenic acid. Carbolic acid.
Phlebitis. Inflammation of a vein.
Phlegmatic. Languid; not sensitive or excitable; heavy.
Phosphate. A compound of phosphoric acid.
Photophobia. Dread of the light.
Phrenology. A so-called "science" of the organs of the brain, supposed to correspond with the faculties and propensities of the mind.
Phthisis. Consumption.
Physical. Material or bodily, as distinguished from mental or spiritual.
Physiology. The science or study of the functions (uses, operations) of the organs of a living being.
Piles. Swellings, often sore and bleeding, near the outlet from the bowels.
Placenta prævia. The after-birth, coming down before the birth of the child.
Planchette. A piece of wood with a pencil attached, for involuntary writing.
Plethora. Excess of blood or excessive richness of the blood.
Pleura. The membrane lining the chest and covering the lungs.
Pleurisy. Inflammation of the pleura.
Pneumatic. Having to do with air or gases.
Pneumonia. Inflammation of the lungs.
Polarity. The mutual relation of opposite things, as the north and south poles of a magnet, etc.
Pons Varolii. A bridge of brain matter in the lower and back part of the head.
Porous. Full of small holes.
Portal. Of the gate; applied to a large vein which carries blood into the liver.
Precocious. Coming forward unusually soon.
Pregnant. Being with child.
Premolar teeth. Those next before (nearest the front) the molar or back jaw teeth.

Presbyopia. Old-sight; long-sightedness.
Prism. A five-sided solid, with two three-sided bases.
Process. In anatomy, a jutting-out part of a bone.
Procidentia. Falling (of the womb).
Prognosis. Knowing beforehand what will happen.
Prolapsus. Sliding downward.
Prophylactic. Preventive.
Prostate gland. A small gland at the base of the genital organs in man.
Prostration. Great weakness.
Proteid. Consisting mainly of protein.
Protein. A substance found by chemists in blood, white of egg, muscle, etc.
Protoplasm. A substance present in the blood of all animals, and in the sap, etc. of all plants.
Protozoa. The lowest and simplest of all animal forms.
Protrusion. Bulging or jutting out.
Prussic acid. Hydrocyanic acid, a very deadly poison.
Pseudo-membranous. Made of false membrane; a deposit (in the throat, for example) from disease.
Psoas abscess. A large gathering under the psoas muscle, within the abdomen.
Psychology. The science or study of the mind.
Puerperal. Belonging to childbearing.
Pulmonary. Belonging to a lung or the lungs.
Pulsate. To beat or throb like a pulse.
Pulse. The beating of an artery under the finger.
Pulverize. To reduce to powder.
Pupa. The middle stage of insect life, usually in a cocoon.
Pupil (of the eye). The opening (surrounded by the iris) through which light passes for sight.
Purgative. Acting upon the bowels; cathartic.
Purpura. A disease in which purple blotches appear on the skin.
Pus. Thick, yellow matter from an abscess, etc.
Pustule. A small swelling containing pus.
Putrefy. To rot.
Putrescent. Liable to rot or decay.
Pyæmia. A disease in which matter (pus) exists in the blood.
Pylorus. The opening at the right-hand end of the stomach into the small intestine.

Q.

Quadrigemina. Made of four nearly equal portions.
Quadruped. A four-footed animal.
Quarantine. Detention (of a ship, etc.) to keep out disease from a place.
Quickening. The movement of a living infant felt within the mother's womb.
Quinsy. Inflammation of the tonsil (in the throat), often with formation of a gathering there.
Quotidian. Occurring (as, a chill) every day.

R.

Rachitis. Rickets.
Radiate. To throw off in rays, as those of heat and light.
Radius. In anatomy, the bone of the forearm whose lower end is nearest the thumb.
Rancid. Spoiled, strong in taste and smell; as, for example, bad butter.
Rectum. The last part of the lower bowel.
Rectus (plural, recti). Straight.
Recuperate. To restore the strength.
Reflection. Turning back.
Reflex. Turning back toward the starting-place or in another direction.
Refraction. Bending out of a straight line.
Refrigerant. Cooling.
Régime (French). A system of usage or management.
Register. In houses, the fixture through which warm air is let into a room.
Relapse. To fall back.
Relax. To loosen.
Remittent. Lessening, without entirely stopping.
Renal. Belonging to the kidneys.
Reproduction. Generation; begetting offspring.
Respiration. Breathing.
Resuscitate. To restore to life.
Retina. The innermost coat or layer of the eye.
Retroversion. Turning backward.
Rhythmic. Occurring in regular successive movements.
Rickets. A disease in which the bones are softened and weakened.
Rigor. A stiffening of the muscles.
Rinderpest. Cattle-plague.
Ringworm. A disease of the skin, with round patches of eruption.

Rôle. A part to be performed.

Roseola. A disease of the skin, with bright red patches of various forms.

Rotate. To go round like a wheel.

Rubeola. Measles.

Ruminant. A cud-chewing animal.

Ruminate. To chew the cud; that is, to chew the food once, swallow it, bring it up again, and chew it a second time.

Rupture. Hernia; the bulging out of a part (knuckle of bowel, for instance) into an unnatural position.

S.

Saccharomyces. The minute yeast-plant found in the foam of beer, etc.

Saint Vitus' dance. Chorea; the jerking disease.

Salæratus. Aired salt; bicarborated potash.

Saline. Salty.

Saliva. Spittle.

Salivate. To increase the flow of saliva, as some medicines do; often with soreness of the mouth.

Salubrious. Good for health (applied to places).

Salutary. Having a good influence on health.

Sane. Sound in mind.

Sanguine. Full-blooded; also, cheerful, confident, hopeful.

Sanitarian. One who is interested in the science of health.

Sanitarium. An institution for the restoration of invalids to health.

Sanitation. Attention to the conditions of a place in regard to health.

Sanity. Soundness of mind.

Saturate. To make a thing take all it can of something else.

Savant (French). A learned man.

Scabies. The itch, a disease of the skin.

Scald-head. Ringworm on the head.

Scapula. The shoulder-blade.

Scarlatina. Another name for scarlet fever.

Sciatica. Pain along the hip and thigh.

Scirrhus. Hard cancer.

Sclerosis. Hardening from disease.

Sclerotic. One of the coats or layers of the eyeball.

Scorbutic. Of the nature of (scorbutus) scurvy.

Scrofula. A constitutional disease, often inherited.

Scurvy. A disease caused by deficiency of fresh food.

Seat-worms. Small white worms in the lower part of the bowels.

Sebaceous. Greasy or grease-producing.

Secrete. To form or throw out something; as the liver secretes bile, the kidneys urine, etc.

Sedative. Soothing, depressing, lowering.

Sedentary. Not active; living with little or no exercise.

Sediment. Something settling down at the bottom of a liquid.

Segregate. To separate and set apart.

Selective. Picking out one thing from amongst others.

Semilunar. Half-moon shaped.

Sensitive. Quick to feel impressions.

Sensori-motor. Moving in response to sensations.

Sensorium. The part of the brain which receives sensations by means of the nerves connecting with it.

Sensory. Having to do with sensation (feeling).

Septic. Of the nature of, or promotive of, decay.

Septicæmia. Disease of the blood from introduction into it of products of decay.

Sequela. That which follows after something else.

Serous membranes. Thin, delicate layers spread out within the cavities of the body; as the *pleura*, *peritoneum*, etc.

Serum. A watery liquid making part of the blood; also moistening serous membranes.

Sewage. The foul matter of houses, stables, streets, etc. collected in a liquid state.

Sewerage. The disposal of *sewage* in pipes, etc.

Shingles. A disease of the skin affecting the middle of the body on one or both sides.

Sinapism. A mustard plaster.

Singultus. Hiccough.

Skeleton. The bony framework of an animal body.

Slough. To mortify and drop off from a living body.

Sodium. The metal of soda and of common salt.

Soft water. Water which will easily make lather with soap.

Soil-pipe. A pipe used to carry off the contents of water-closets, urinals, etc.

Solarium. A room open above to receive the rays of the sun.

Somnambulism. Walking in one's sleep.
Sonorous. Making a loud or considerable sound.
Sordes. A thick deposit on the tongue, gums, etc. in fever.
Spasmodic. Occurring in spasms or spells; not continuous.
Specific. Peculiar; distinct from everything else in nature or effect.
Spectroscope. An instrument to examine rays of light passing through different substances.
Spectrum. An image produced by rays of light passing through a body; for example, that made by sunlight going through a glass prism.
Sphincter. Contracting and closing an opening.
Sphygmograph. An instrument by which the pulsations of an artery may be measured and recorded.
Spina bifida. Cleft spine; a deformity sometimes met with in newborn infants.
Spine. The backbone.
Spleen. A round, slate-colored gland situated near the stomach.
Splenic. Belonging to the spleen.
Statistics. Facts arranged in precise figures concerning any subject.
Stercoraceous. Containing fecal matter—i. e. that belonging to the lower bowels.
Stereoscope. An instrument which gives pictures seen through it a solid appearance.
Sternum. The breast-bone.
Stertorous. Snoring.
Stillborn. Born dead.
Stimulant. Exciting.
Stimulate. To excite; to bring out the action of a living organ or system.
Stone. In medicine, a hard body found in the kidney, urinary bladder, etc.
Strabismus. Squinting, cross-eyes.
Strangulation. Strangling, choking, as in hanging.
Strangury. Difficulty in passing water from the bladder.
Striated. Striped.
Stricture. A tightening or obstruction; as of the urethra (passage from the urinary bladder).
Struma. Scrofula.
Stupor. A dead sleep, from which a person cannot be roused.
Stye. An inflamed swelling on the eyelid.
Styptic. Something used to check bleeding or other discharge.
Subclavian. Under the collar-bone (clavicle).
Subcutaneous. Under the skin.
Subpolar. Under or near one of the poles of the earth.
Subsoil. The earth underneath the surface of the ground.
Subsultus. Jerking, irregular motion; as of the tendons (leaders) at the wrist in fever.
Subterranean. Under ground.
Subtropical. Near the tropics; next to the equatorial part of the earth.
Sulphate. A compound of sulphuric acid.
Sulphide. A compound of the element sulphur.
Sulphite. A compound of sulphurous acid.
Sulphuric acid. Oil of vitriol, a very strong acid liquid.
Suppository. A small mass of something prepared for insertion into the lower bowel.
Suppression. Complete stoppage.
Suppuration. Formation of matter (pus) in a part of the body.
Symbol. A sign representative of something; for example, in chemistry the symbol of oxygen is O; of hydrogen, H, etc.
Symmetry. Equal balance or proportion of parts; as between the two arms and hands, etc.
Sympathy. Feeling together; one being affected by the feeling of another.
Syncope. Fainting.
Syntonin. A substance obtained by chemists from flesh.
Syphilis. An ugly disease caused by impure sexual intercourse.
Syringe. An instrument used to inject liquids into a cavity; a small hand-pump.

T.

Tabes. A slow, weakening, and wasting disease.
Tænia. Tape-worm.
Tannin, or tannic acid. An astringent substance obtained from oak-bark, nutgalls, etc.
Tartar, on the teeth. A rough, hard deposit formed when the teeth are neglected.
Tartaric acid. One of the acids of grape-juice.
Tartrate. A compound of tartaric acid.

Tegument. Skin, outer covering.
Temperament. Habit of body and mind; special constitution.
Temperate. Moderate; not extreme either way.
Temporal region. In anatomy, the *temples* on the two sides of the head.
Tentator. One who, or that which, tries or tests something.
Tertian. Occurring (as chills) on the first and third days; every other day.
Tetanus. Lockjaw; a very severe and often fatal disease.
Thalamus. In anatomy, a part of the base of the brain.
Theine. The principal active substance contained in tea.
Theobromin. An active principle obtained from *cacao-* (cocoa) seeds.
Therapeutics. The science of the action of remedies in treatment of disease.
Thermic. Having to do with heat.
Thermometer. An instrument to measure degrees of heat.
Thoracic. Belonging to the thorax or chest.
Thorax. The chest, enclosed by the ribs, breast-bone, and spine.
Thrush. A disease of the mouth, most common in children.
Thyroid gland. A gland in front of the throat, which is much enlarged in *goitre.*
Tic douloureux. Neuralgia of one side of the face and head.
Tincture. A preparation made with alcohol.
Tinnitus aurium. Ringing or roaring in the ears.
Tissue. Stuff, fabric; that of which organs are made (anatomy).
Tonic. Increasing *tone* and strength. *Tonic spasm* is fixed, rigid contraction of muscles.
Tonsil. A small gland on each side of the throat.
Tonsillitis. Inflammation of one or both of the tonsils.
Torniquet. An instrument used to check bleeding from wounded arteries.
Torrid. Very hot.
Torula. The yeast-plant; *Saccharomyces cerevisiæ.*
Toxæmia. Poisoned blood.
Toxic. Having to do with poison or poisons.
Toxicology. The science or study of poisons.
Trachea. The windpipe below its first part, which is called the *larynx.*
Tracheitis. Inflammation of the trachea.
Translucent. Allowing light to pass through.
Transparent. Capable of being seen through.
Transpiration. Passing through slowly.
Trap. In a house, a fixture used to keep foul air from getting back from soil-pipes, etc.
Tremens. Trembling or attended by tremor.
Trichina. Thread-worm, a parasite of pork.
Tricuspid. Three-parted; applied to one of the valves of the heart.
Trismus. Lockjaw.
Tropical. Belonging to the equatorial part of the globe.
Tropics. Lines at a certain distance on each side of the equator.
Tubercle. A deposit caused by disease in the lungs or other parts of the body.
Tuberculosis. Tendency to formation of tubercle; the tuberculous constitution.
Tympanic. Drum-like.
Tympanum. A drum; in anatomy, the drum of the ear.
Typhlitis. Inflammation of the larger bowel.
Typhoid. Low, prostrating, stupefying, or stupefied.
Typhus. Stupid or stupefying (the name of a low fever).
Typical. Showing a type; a representative thing or form.

U.

Ulcer. An open sore on any part of the body.
Ulna. The bone of the forearm which connects with the wrist on the little finger side.
Unconscious. Not knowing anything, as in a faint or a stupor.
Undulating. Moving in waves.
Unguent. Ointment.
Unleavened. Made without yeast, not raised.
Uræmia. Tainting of the blood with matters belonging to the urine.
Urate. A compound of uric acid.
Urea. One of the substances contained naturally in the urine.
Ureter. One of the tubes which connect the kidneys with the bladder.

Urethra. The tube which carries out the urine from the bladder.
Uric acid. A substance naturally contained in the urine.
Urination. Passing water from the bladder.
Urine. The water formed in the kidneys and passed out from the bladder.
Urticaria. Nettle rash, a kind of skin disease.
Uterine. Belonging to the uterus (womb).
Uterus. The womb.
Utilize. To make useful.
Utopian. Too good to be made to happen.

V.

Vaccinate. To inoculate with matter from cowpox.
Vaccinia. Cowpox.
Vagina. The outlet from the womb.
Vapor. Steam; moisture (of any liquid) rising into the air.
Varicella. Chicken-pox.
Varicose. Enlarged; swollen in parts (as, for example, veins).
Variola. Small-pox.
Varioloid. Small-pox modified by the effect of vaccination.
Vaseline. Cosmoline; a substance obtained from coal oil, and used instead of grease.
Vegetarian. One who eats only vegetable food.
Vegetative. Belonging to, or like, vegetable life.
Vehicle. Something which carries.
Vein. A vessel conveying blood toward the heart.
Vena cava (ascending and descending). The name of each of the two largest veins in the body, both entering the heart.
Venesection. Opening a vein to draw blood.
Venom. Poison.
Venous. Belonging to a vein or the veins.
Ventilate. To change the air of a place.
Ventricle. One of the larger cavities or chambers of the heart.
Verdigris. Copper rust; carbonate or acetate of copper.
Vermifuge. A drug which will, when taken, kill or drive out worms.
Vertebra. One of the natural pieces of the backbone.
Vertebrates. Animals having backbones.
Vertical. Straight up and down.
Vertigo. Giddiness.
Vesicate. To raise a blister.
Vestibule. A threshold; in anatomy, part of the internal ear.
Vibrate. To quiver or move in small waves, as the metal of a bell does when struck.
Vibrio. A very minute living form often found in living and dead organic bodies.
Visible. That which may be seen.
Vision. Sight.
Visual. Belonging to sight.
Vitalize. To give life to anything.
Vitiate. To spoil badly.
Vitrefied. Brought to a glass-like condition.
Vitreous. Glassy; like glass.
Volatile. Easily turned to vapor by heat.
Voluntary. Done, or possible to be done, at the bidding of the will.
Vulcanize. To harden by heating with an appropriate substance (applied to India-rubber).

W.

Water-brash. Water coming from the stomach into the mouth.
Water-seal. The water in a trap (which see) to keep gases from going through it.
Wean. To get one away from, or out of the habit of, something.
White vitriol. Sulphate of zinc.
Whites. A discharge from the womb or vagina in women.
Whooping cough. Hooping cough.
Windpipe. The tube in the throat through which we breathe.
Wrist-drop. Palsy of the muscles of the arm from lead-poisoning.

Z.

Zest. Strong interest in something.
Zone. A region of the earth—arctic, temperate, tropical, etc.
Zymotic. Caused by a process in some respects like fermentation.